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Philadelphia International Exhibition, 1876.

MEXICAN SECTION.

Special Catalogue

AND

EXPLANATORY NOTES.

PHILADELPHIA:
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1876.

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INTRODUCTION.

THE political convulsions of the Spanish-American Republics, have been judged too severely when these new countries, born under difficult circumstances, have been held responsible for certain political and social conditions which are not their work. The very fact that the same phenomena have been reproduced in all the countries that once were Spanish colonies, induces us to attribute them to the same general cause, and not only to local aberrations and errors of such and such a people or government.

But whatever may have been the disturbances which have characterized the youth of the Spanish-American countries, it is a noticeable fact that they came to their political existence prompted by noble aspirations to civilization and progress, and are maintaining a struggle, worthy of sympathy, to overcome the difficulties which had impelled them to arrive at a level with the most advanced nations. This statement, which might appear as a delusion produced by an exaggerated sentiment of nationality, can now be made without the fear of such a reproach, in view of the articles brought to the International Exhibition by said Republics. Those exhibits lead to the remark that whilst those countries have kept one hand, so to speak, on the plow or the spinning-wheel, they have been forced either by intestine quarrels or by foreign wars to grasp the musket with the other. Political agitations have choked many of their resources, consuming a great part of their vitality; but a tree cannot be trimmed without losing some drops of its sap, and the Spanish American nations have been obliged to lop off many political and social excrescences that prevented them from taking free flight into the orbits of civil liberty and material progress.

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For many years has Mexico struggled since her independence, to disarm two powerful classes whose political preponderance was one of the inheritances of the colonial *regime*, and whose pretensions to perpetuate a retrograde and parasitic influence constituted for a long time the yeast that fermented civil war. During that same period, which embraces nearly half a century, Mexico was four times cursed with the plague of foreign war.

At almost regular intervals of a decade, foreign arms have come to disturb the domestic existence of the Mexican people. There is, therefore, no lack of some exculpating circumstances of this character to put in as a plea before the Congress of Civilization now assembled in Philadelphia, to show why the display of natural and industrial products with which Mexico has contributed to the international exhibition, is not as large as the contributions of other nations.

The Mexican exhibit is not of a collective, systematic and official character: it has not an historical aspect, presenting in progressive series the relics of the Aztec civilization, the state of the national industry when the country accomplished its independence, and its present products and manufactures. Had it been prepared in this wise, the different grades through which Mexico has been moving onward, though slowly, in the road of material and moral progress, might easily be traced. But the share with which Mexico has contributed to this exhibition, has not been prepared from this point of view. When the United States invited her neighbors of the other side of the Rio Grande to the interesting festival of Philadelphia, the Government of Mexico preferred to produce a popular movement in the country, by transmitting the invitation to the producing and manufacturing classes, offering them at the same time all the necessary facilities of remitting, placing, and preserving those objects which they might think fit for exhibition. For this preparatory work a board of respectable persons was organized, and this board sent an exploring Commission to the United States at first, and afterwards a residing Commission, invested with the local administration of the Mexican exhibit. There is one fact, easy to be perceived and explained, viz.: that the industrial classes of Mexico corresponded in a somewhat lukewarm manner to the official invitation; and though the Government paved the way by defraying

the expenses of transportation, placing, preserving, and returning to the owners the objects exhibited, neither the best products of certain industries, nor any samples of others, that have arrived to the highest degree of perfection in Mexico, have been sent to Philadelphia. As an instance of the former, the exhibits in the group of woolen and cotton fabrics of the Mexican Department may be cited; and as a proof of the latter, we might refer to the absolute lack of any exhibit in the line of saddlery, cabinet-making, and fine hardware, some of which have attracted the attention of foreigners in Mexico.

But, be this as it may, the display to which the following catalogue refers, has fulfilled its objects in a great measure, by establishing a point of contact between centres of production and consumption, which, heretofore, had never approached each other. The tardiness shown by the Mexican industrial classes to contribute to this Exhibition, can be explained by very obvious facts, leaving aside the consideration that the country is very little habituated to this sort of competition. It may be said in truth that, up to a very recent date, almost no commercial relations existed between the greatest part of the Mexican industries and the foreign markets. A link begins now to be formed, which the Philadelphia Exhibition will contribute to anneal.

In going through the Mexican exhibit, commentated by the information annexed to this catalogue, anybody can see a country arriving at the very moment of youth, that is to say, at that period of life in which the existence of the human being spreads itself over the existence of others. In the life of nations there is a similar period: the industrial and moral vitality of Mexico has been inclosed within the interior bounds of the country. This is the first time that some of her products and manufactures appear in an international exhibition, and that the discoveries of some Mexicans begin to contribute to the furtherance of science. There are reasons to believe that the Exhibition of Philadelphia will give a patent of introduction into foreign markets to many of the Mexican articles: such for instance as the different kinds of marble, sulphur, sugar, coffee, fibres, fine woods, &c., &c. These products will be exported, hereafter, on a larger scale than heretofore, through the means of importations of machinery, of reproductive animals,

of instruments of mining and foreign manufactures, the consumption of which will increase in Mexico in the same proportion as her national activity and welfare. The Mexican Republic will have good reasons in the future to bless the Exhibition of Philadelphia. The benefits of this interesting concourse, in very few countries, will be more palpably felt than amongst the southern neighbors of the United States. On the other hand, the cordial reception which Mexico has met with from all the other exhibitors, without discrimination of nationalities, and the honorific benevolence with which the Judges of awards have appreciated the products and manufactures of that country, will be another stimulus to her industries. The political disturbances of the country are approaching an end; peace in Mexico has, as a guarantee for the future, the aspirations of the people at large to tranquillity and peaceful progress. Perhaps the date at which the Mexican people for the first time have taken a place in the industrial and scientific Congress of all the civilized nations, will mark for that Republic the commencement of an accelerated movement in the road of prosperity.

The department occupied by the Mexican display in the Main Building, embraces 6504 square feet, and is located between the columns A and K and the sections 64½ and 66. Here are exhibited those articles comprehended in the groups i. ii. iii. v and vii. of the classification adopted by the United States Centennial Commission.

The Mexican paintings and sculptures have been exhibited in the rooms 9 and 29 of the Annex to Memorial Hall and in room 6 of the latter; the photographs having been displayed in the screen 19, west of the Photographic Hall.

The Commission organized in the City of Mexico to attend to the collection and remittance of the articles for exhibition in Philadelphia, is constituted by the following members:

Manuel Romero Rubio, President.
Ramon Alcaraz.
Gabriel Mancera.
Rafael Martinez de la Torre.
Julio Zarate.
Luis Malanco.

under construction, and in operation as far as the town of Tlalnepantla. Another line connects the port of Vera Cruz with the town of Medellin. The capital is connected by electric wires with the principal cities and with the ports and coasts of the republic.

The United States of Mexico maintain an active trade with the following nations, viz. : England, France, United States, Germany, Spain and Cuba, New Granada, Guatemala, Nicaragua, and on a smaller scale with Belgium, Ecuador, and Italy.

The imports of foreign goods during the fiscal year ending June, 1873, amounted to $29,062,406.94, taking as a basis the market value of the articles. All the articles are registered in the custom-house tariff of duties under eleven heads, viz. :

	INVOICE VALUE.	MARKET VALUE.	DUTIES.
1. Cotton	$7,311,646.03	$10,531,970.15	$4,734,340.87
2. Groceries	3,437,525.43	5,191,788.62	2,102,509.30
3. Articles free from duty	2,411,593.73	3,354,259.77	
4. Mercury	1,356,600.31	2,184.014.56	763,908.87
5. Miscellaneous	1,434,216.56	2,035,609.63	1,055.828.05
6. Linen and hemp	993,362.76	1,452,978.28	564.125.89
7. Wools	1,038,044.31	1,427,867.58	644,496.77
8. Mixtures	998,831.81	1,417,427.61	605,146.49
9. Silks	419,017.10	588,911.32	267,404.71
10. Earthenware, crystal & glass	344,936.45	577,510.82	206,547.31
11. Drugs	173,852.32	300,069.05	131,011,38
	$19,919,612.81	$29,062,406.94	10,989,319.64

The value of goods exported amounts to $31,473,607.24. The exports are arranged under two heads :

Minerals and metals	$25,373,673.78
Agricultural and industrial products	6,317,477.06
Total	$31,691,150.84

Under the first heading are :

Silver coin	$22,602,493.33
Solid silver	1,512,616.94
Gold coin	640,270.97
Solid gold	288,578.21
Ores and mineral earths	222,854.00
Silver amalgam	39,251.78
Lead	30,831.00
Copper	17,137.94

Under the second heading:

Skins	$1,546,869.43
Henequen	1,049,202.58
Building and color woods	1,042,586.31
Coffee	532,912.86
Vanilla	414,038.40
Cochineal	276,699.30
Cattle	209,960.00
Tobacco	132,984.75
Orchilla (Rocsella tintorea)	128,450.09
Precious pearls	109,300.00
Caoutchouc	93,052.88
Sarsaparilla	90,862.18
Wool	88,635.72
Indigo	80,229.87
Jalap	77,517.40
Cocoanuts	46,000.00

The revenue of the General Government and the expenses of the Federal Administration amount to a yearly average of 20,000,000 dollars.

There have been 8103 schools established by the Government for the primary instruction of the people. In eighteen of the States attendance has been made compulsory.

The official data in regard to secondary and higher instruction are condensed in the following figures relating to the institutions of these two degrees, maintained by the Mexican government.

26 Preparatory Schools.
18 Colleges of Jurisprudence.
12 " " Engineering.
11 " " Medicine.
9 " " Pharmacy.
2 " " Navigation.
2 " " Agriculture.
2 " " Mining.
2 Conservatories of Art.
3 " " Music.
15 Ladies' Colleges.

The above list does not include a large number of establishments conducted by the clergy, benevolent societies, or private teachers.

DEPARTMENT OF COLONIZATION, INDUSTRY AND COMMERCE.

Section 1st.

The President of the Republic has sent me the following decree:

"SEBASTIAN LERDO DE TEJADA, constitutional President of the United Mexican States, to the inhabitants therein, know:

"That Congress has issued the following decree:

"Congress resolves:

Art. 1. Until a law shall be enacted that shall definitely determine and regulate everything concerning colonization, the Executive is hereby authorized to enforce this law either by direct action or by means of contracts carried out by private organizations, under the following bases:

I. To grant each organization—a subsidy for each family that shall settle, or a smaller subsidy for each family that shall land, in some place in the Republic; an advanced portion, not exceeding 50 per cent. of said subsidy at reasonable rate per cent. interest; lands capable of being colonized, after measurement, survey and valuation, at a moderate price payable on ample time in annual installments; a premium for each immigrating family; an exemption from duties to every vessel that shall bring to the Republic, ten or more families; a premium for each native family that shall settle in immigrant colonies; a premium for each Mexican family that shall settle in frontier colonies.

II. To require from said organizations: a sufficient guarantee for the fulfillment of their contracts, stating the cause of forfeiting and of fine; a security that the colonists shall enjoy, as far as it may depend on the contractors, the privileges granted by this law.

III. To grant the settlers: Mexican naturalization and citizenship in the proper cases; an advanced payment of transportation

expenses; a living for one year after they have settled, farming tools and building materials for the construction of their houses; an acquisition of a determined tract of land, for tillage and building purposes, at a low price, payable on ample time, in annual installments, commencing from the second year after the settlement; exemption from military service and all kind of imposts, excepting municipal taxes; exemption from all kind of importation and interior duties on everything destined for the colonies, such as farming and shop tools, machines, chattels, building materials, domestic furniture, working and breeding animals; exemption also, personal and not transferable, from export duties on their crops, and free letter postage, through the Department of Foreign Affairs or by means of especial postage stamps, over their native country or former residence; premiums and especial protection for the introduction of a new culture or industry.

IV. To demand from the settlers the fulfillment of their contracts in accordance with the common laws of the country.

V. To appoint and send to the field the reconnoitering commissions authorized by the 26th section of the present budget, to select the lands capable of being colonized, with the due requisites of measurements, demarcation, valuation, and description.

VI. That any person occupying a tract of public lands in obedience to the requisites demanded by the previous fraction, shall have one-third of said land or its value, provided said person be duly authorized.

VII. This power of authorization shall belong exclusively to the Executive, who shall not deny the same to any State that may demand it for the lands within its boundaries. The authorization granted, as above, to the States or private citizens, shall be void if for three months from the granting thereof, the corresponding operations (stated in section V.) have not been commenced.

VIII. To acquire, if deemed expedient, by purchase or any contract in accordance with the rules already fixed in fraction VI. lands capable of being colonized, owned by private citizens.

IX. To locate upon the lands of private citizens, when the owners of the same desire it, colonists that, by virtue of the immigrating contracts already made, may be at the disposal of the Executive.

X. Said colonies shall be considered as such, and shall enjoy the peculiar privileges above related for ten years, at the expiration of which said privileges shall cease.

Art. 2. The Executive is likewise authorized to dispose, in the next fiscal year, of the amount of $250.000 to defray the expenses required by this law, including the surveying commissions.

Legislative Palace, Mexico, May, 1876.—Julio Zarate, presiding Representative.—Antonio Gomez, Secretary Representative.—J. N. Villada, Secretary Representative.'

"I order, therefore, the above law to be printed, published, circulated and complied with.—Executive Palace, Mexico, May 31, 1876.—Sebastian Lerdo de Tejada.—To Blas Balcarcel, Minister of Colonization, Industry and Commerce."

I communicate the same to you for your own knowledge and proper uses.—Independence and Liberty, Mexico, May 31, 1876.—Balcarcel.

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CATALOGUE.

DEPARTMENT I.

MINING AND METALLURGY.

Minerals, Ores, Stone, Metallurgical Products.

1. Sanches, Ochoa, Gaspar, City of Mexico. Sulphur from the Volcano Popocatepetl, . . . 100

2. Mexican Mining Society, City of Mexico. MINERALS.
Gold Ores: Native Gold.
Silver Ores: Native Silver, Argentite, Polybasite, Argentiferous Galenite, Pyrite and Sphalerite.
Copper Ores: Cuprite and Malachite.
Mercury Ores: Livingstonite, Cinnabar.
Iron Ores: Argillaceous Hematite.
Bismuth Ores: Bismuthite.
Mineral Coal: Anthracite, . . Class 100–102

3. School of Engineers, City of Mexico. Minerals and Rocks.
Silver Ores: Bromyrite, Proustite, Pyrargyrite, Argentiferous Galenite, Pyrite and Sphalerite.
Mercury Ores: Guadalcazarite, Cinnabar.
Graphite:
Silic Acid: Precious Opal.
Rocks: Trachite, Tufa, Lithomarge, . Class 100–104

NOTE.—*The interlinear numbers, as well as those seen at the head of the different departments in this Catalogue, designate the class to which the exhibit bearing it belongs according to the classification adopted by the Centennial Commission to facilitate the Judges' work.*

4. National Museum, City of Mexico. Minerals and Rocks.
Arsenic Ores: Realgar, Arsenopyrite.
Silver Ores: Native Silver, Cerargyrite, Bromyrite imbedded in Quartz (specimen weighing 1300 pounds), Tetrahedrite.
Lead Ores: Minium, Pyromorphite.
Mercury Ores: Cinnabar.
Copper Ores: Native Copper, Cuprite, Chalcocite, Chalcopyrite, Erubesite.
Iron Ores: Meteoric Iron, Magnetite, Globular Hematite, Limonite, Pyrite, Marcasite.
Silic Acid: Rock Crystal, Calcedony, Amethyst, Fire-opal.
Silicates: Garnet, Apophilite, Chovelite, Red Obsidian, Black Obsidian (specimen weighing 250 pounds) Clay, Asbestus.
Carbonates: Calcite, Bismuthite.
Rocks: Marbles, Alabaster, Lithomargues. 100–102

5. Barcena Mariano, City of Mexico. Livingstonite (Sulphuret of Antimony and Mercury), . . 100

6. Tolsa J., City of Mexico.
Mercury Ores: Cinnabar from Pregones Mine, . 100

7. Natural History Society, City of Mexico. Minerals.
Gold Ores: Auriferous Cuartz.
Silver Ores: Native Silver.
Copper Ores: Cuprite and Malachite.
Mercury Ores: Cinnabar.
Lead Ores: Galenite.
Iron Ores: Meteoric Iron, Hematite, (Pseudomorfus after Pyrite.)
Bismuth Ores: Selenide of Bismuth, Bismuthite, 100

8. Gov't State of Durango, Durango City.
Iron Ores: Martite (specimen weighing 75 pounds), 100

9. a Muller F. Chihuahua City, Meteoric iron (specimen weighing 3200 pounds), ... 100

10. Sotomayor, C —— Angangueo (Michoacan).
Silver Ores: Argentiferous Pyrite and Galenite, . 100

11. Rul Miguel, City of Guanajuato.
Silver Ores: Pyrargyrite, Polybasite, Argentiferous Galenite and Pyrite.

Iron Ores: Melanterite.
Silic Acid: Quartz and natural Gelatinous Silice.
Silicates: Mountain Leather.
Native Sulphur.
Carbonate: Calcite.
Rocks: Metalliferous Slates and Diorite, . 100–111

12. Corcuera Manuel, Tula, State of Jalisco.
Iron Ores: Hematite, Limonite,
Metallurgical products: Wrought and cast iron, . 100-111

13. Real del Monte Company, Pachuca City.
Silver ores: Native silver, Argentite, Argentiferous Galenite and Pyrite.
Silicates: Bustamite.
Carbonates: Rhodocroisite.
Rocks: Metalliferous Porphyries, . . 100-111

14. State Government of Oaxaca, Oaxaca City.
Gold ores: Native gold.
Silver ores: Native silver, Argentite, Argentiferous galenite.
Copper ores: Azurite.
Lead ores: Cerusite, ... 100

15. San Rafael Company, Zacatecas City.
Silver ores: Pyrargyrite, . . . 100

16. Quebradilla Company, Zacatecas City.
Silver ores: Pyrargyrite, Polybasite, Argentiferous Galenite and Pyrite, ... 100

17. Mala Noche Company, Zacatecas City.
Silver ores: Ditto. 100

18. Ponce Juan, Zacatecas City.
Silver ores: Ditto, ... 100

9. Becerra Jose Ma., Zapuri (Chihuahua).
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20. Martinez J. Huitzuco (Guerrero).
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Silver ores: Tetrahedrite, Argentiferous Pyrite and Galenite. Metallurgical products: Calcined minerals, escorias and argentiferous lead. This collection shows the different alterations which the ores undergo in the melting metallurgical process, from their natural state to the extraction of silver.

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206.	RAMIREZ, JOAQUIN.....	Portrait of Hidalgo, father of Mexican Independence.	" "
207.	PINA, SALOME.....	Saint Charles.	"
208.	RAMIREZ, JOAQUIN.....	Noah's Ark.	"
209.	MONROY, FELIX.....	The Death of Atala.	"
210.	VELASCO, JOSE MARIA...	The Valley of Mexico.	Artist.
211.	FIGUEROA, GREGORIO....	The Death of Abel.	National Academy.
212.	VELASCO, JOSE MARIA...	Wood of Chapultepec.	"
213.	JIMENEZ, JOSE.....	Interior of the Convent of Loreto —City of Mexico.	" "

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214.	REBULL, SANTIAGO.....	The Death of Marat.	Artist.
215.	FLORES RAFAEL.....	Dante.	National Academy.
216.	DUMAINE, GREGORIO.....	The Road of Chapultepec.	"
217.	GARGOLLO, JULIO....	The Morning Paper.	Artist.
218.	COTO, LUIS.....	The Town of Guadalupe—Hidalgo.	National Academy. "
219.	GONZALES, J.....	Evil Presentiments.	Artist.
220.	CORDERO, JUAN.....	Columbus before the Court—Ferdinand and Isabella.	" "
221.	OCARANZA, MANUEL.....	The Withered Flower.	"
222.	MANCHOLA, JUAN.....	Saint Peter Restoring a Child.	"
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227.	PARRA, FELIX.....	Galileo.	"
228.	VEGA FIDENCIE DE LA...	The Fall of Satan.	"
229.	GUITERREZ, RODRIGO....	The Fisher Boy.	"
230.	FERRANDO, SALVADOR...	Jacob Anointing a Rock.	"
231.	MONTENEGRO, GUADALUPE.....	The Young Sketcher.	"
232.	ESPRONCEDA, JOSE.....	Portrait of Benito Juarez, late President of Mexico.	Artist.
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234.	VILLALPANDO, C. DE.....	Interior of the Convent of Bethlemitas—XVIIth century.	" "
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239.	CORREA, NICOLAS..... ..	Saint Cataline of Sena—XVIIth century.	" "
240.	LOPEZ DE HENERA, N....	The Crucifixion.	"
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MINING AND METALLURGY.

MINERALS, ORES, STONES, MINING PRODUCTS.

THE mineral section of the Mexican department in the Main Building is mainly composed of collections of ores bearing metals more largely used in industry. These collections, therefore, do not impart the most complete idea of the mineral character of the districts whence they are taken. Some knowledge can be had, nevertheless, of the geological formation of some of the mineral regions represented in this section by several rocks therein exhibited. The Departments of Mining and Metallurgy have been under the charge of Prof. Mariano Barcena, who has adopted in their arrangement and classification the synonymy of Prof. J. D. Dana.

The products of the mines of Mexico supply, besides the whole of the interior needs of the country, an exportation which, under the form of coin, solid masses or metaliferous stone, lately have been rapidly increasing. During the year 1873, the quantity of mineral ores exported from Mexico amounted to $222,854.

The following notes, arranged in an alphabetical order, may convey an idea of the character of the minerals exhibited in the Mexican section :

ARSENIC.

This metalloid is found in its native form in the State of Hidalgo, combined with sulphur, forming rejalgar and orpiment, in Zimapam, same State, and in several regions of the country, combined with iron. The specimens of Rejalgar and Arsenopyrite come, respectively, from the States of Hidalgo and Michoacan.

BISMUTH.

Bismuth, in Mexico, has been discovered not only in a native form, but in that of a Sulphuret, Selenid, Tellurid and Carbonate. Prof. Antonio del Castillo of Mexico discovered, three years ago, the selenid species, and some time afterwards, the analysis of this mineral was made by Mr. Vicente Fernandez, of the City of Guanajuato, who called it Guanajuatite. Prof. J. D. Dana, willing to perpetuate the name of Mr. Frenzel, who made and published a complete study of this species, has called it Frenzelite.

Prof. Frenzel's analysis is as follows :

Selenium,	24.13
Bismuth,	67.38
Sulphur,	6.60
	98.11

Bismuth, under the species of the above analysis, abounds in Santa Rosa district, State of Guanajuato. The carbonate assumes the shape of compressed crystals or of botroidal masses contained in siliciferous porphyry. It was found in the hills of Buena Vista and La Cruz, in the State of San Luis Potosi, by Mr. Florencio Cabrera. Its composition is as follows:

Oxide of Bismuth,	90.10
Carbonic Acid,	7.00
Sulphuric Acid,	0.27
Water,	1.80
Loss,	0.83
	100.00

COPPER.

Among the mineral specimens sent to the exhibition by the National Museum of Mexico, there are several of native copper, cuprite, chalcopyrite and chalcocite.

The cupriferous regions of the State of Chihuahua, wherefrom the samples of native copper have been taken, are at present in full explotation, a large quantity of the copper obtained being exported,

and the other made use of in the coinage of the country. The samples of Chalcopyrite and Chalcocite proceed, the former from the State of Michoacan, and the latter, from that of Veracruz.

The numerous deposits of sulphurated minerals of copper in Mexico are largely used in the preparation of the sulphate of copper, which is employed in the metallurgical system of amalgamation. The oxidation of copper pyrites is made by roasting them at the open air, from which process the mineral called *magistral* is obtained.

In the districts of Tepezala, Mazapil and Ramos, (States of Zacatecas and Aguascalientes,) Chalcopyrite, as well as Erubesite which accompanies it, are extensively used. The veins of Tepezala are situated in a formation of Metamorphic limestone, slates, and green stone. The Erubesite in the first named District is intermingled with Actinolite, as it is the case in some districts of Germany. That from Ramos was analyzed by Prof. Rammelsberg with the following result:

Sulphur	25.27
Copper	61.66
Iron	11.80
Lead	1.90
Silver	tr.
	100.63

The Society of Natural History of Mexico, exhibits several samples of compact Cuprite, which show beautiful crystals of Malachite. These specimens come from the rich Districts of Matehuala, State of San Luis Potosi.

GOLD.

Several are the Mexican districts from which gold in a native condition is obtained. Among the most prominent may be mentioned those of Zimatlan and Etla (State of Oaxaca) the Gold District in the State of Mexico, San Nicolas del Oro (State of Guerrero), and those in the States of Chihuahua, Michoacan, and Territory of Lower California.

The numerous specimens of quartz containing native gold exhibited in the Mexican section, came from several of the above-mentioned localities. They present a grayish color stained with oxide of iron, as it is generally the case with this kind of ores, and marks of Calcedony. It is to be noticed that the gold bearing quartz sent from San Nicolas del Oro, contains a larger quantity of both iron and gold than those of any of the other districts alluded to. A great portion of the gold brought to the Mexican mints is the product of the separation from the auriferous silver.

IRON.

Iron exists almost in all mineral districts of Mexico. Specimens of Martite, Hæmatite, Magnetite, Limonite, Globular iron and argilliferous Hæmatite, are exhibited in this section.

Martite comes from the famous mountain of Mercado, near the city of Durango. That mountain is almost totally formed of iron ore. The specimen on exhibition shows numerous octahedral crystals of martite. The Globular iron is met with on the hill of Galvan, (state of Puebla) and the Hæmatite and Limonite in several districts of the country.

Some specimens of metallic iron were sent by the large mills of Encarnacion (State of Hidalgo), Tula, (Jalisco,) and Oaxaca. The mountain of Cangando which contains large masses of magnetic iron is in its greater part, formed of metamorphic lime-stone of the cretaceous period. The ores worked upon in the iron mills of Tula are composed as follows:

SAMPLE NO. 1.

Silica	1.40
Water	0.90
Alumina	0.76
Phosphoric Acid	0.39
Sexquioxide of Iron	95.97
Lime	0.32
Magnesia	0.57

SAMPLE NO. 2.

Silica	1.70
Water	1.16
Alumina	0.58
Phosphoric Acid	0.06
Sexquioxide of Iron	95.97
Lime	0.27
Magnesia	0.26

SAMPLE NO. 7.

Silica	4.72
Water	5.69
Alumina	1.20
Phosphoric Acid	0.47
Sexquioxide of Iron	86.87
Sexquioxide of Manganese	0.52
Lime	0.48
Magnesia	0.25

Prominent among the masses of Meteoric iron is the one sent from the State of Chihuahua by Mr. E. Müller, which, is remarkable not only on account of its large size but for its crystalline texture. The one exhibited by the Society of Natural History, although smaller than the first, is highly interesting by its clear and well defined crystals. This meteorite shows in all directions distinct cleavages which divide the mass in perfect octahedrons. It was found in Xiquipilco (State of Mexico) its analysis being as follows:

Iron	90.43
Nickel	7.62
Cobalt	0.72
Phosphorus	0.15
Copper and Tin	0.03
Sulphur	0.03
Schreibersite.	1.56
Graphite	0.34
	100.88

LEAD.

Galenite, Cerusite, Minium and Pyromorphite are the principal lead-bearing ores on exhibition in the Mexican section.

Mr. Farrugia's collection includes remarkable specimens of Galenite containing argentiferous pyrite and Fluorine. They come from Zimapan, one of the richest mining districts in Mexico. Specimens of Minium as well as of Pyromorphite and Cerusite coming respectively from Bolanos and Zimapan are seen in the Mexican Department.

MERCURY.

Cinnabar is undoubtedly one of the most abundant ores in Mexico. Thirty are the principal localities which, in a paper published by Prof. A. del Castillo, are mentioned as containing large quantities of this mineral.

The specimens of Cinnabar exhibited in this section come from Guadalcazar (State of San Luis Potosi), Pregones and Huitzuco (State of Guerrero), and Doctor (State of Queretaro); their principal exhibitors being The National Museum, the School of Mines of the City of Mexico, and Mr. Tolsa, from Guerrero. To the National Museum belongs a piece of a vein of Cinnabar imbedded in a crystalline mass of selenite, shown near the main entrance of the Mexican Department. It deserves to be noticed among the mercurial minerals, one discovered by Prof. del Castillo ~~who~~ named ~~it~~ Guadalcazarite and analyzed by Professor Petersen, with the following result:

Sulphur,	14.58
Selenium,	1.08
Mercury,	79.73
Zinc,	4.23
Cadmium	tr.
Iron,	tr.
	99.62

Another new combination of mercury was described two years ago, by Prof. Mariano Barcena, member of the Mexican Commission,

and he gave to it the name of Livingstonite. It is a sulphuret of antimony and mercury, very well crystallized, and rather similar to stibnite; but it presents a red-brown streak. That compound comes from Huitzuco, (State of Guerrero,) where it has been found lately in large quantities, mixed with cinnabar, oxide of antimony, and other minerals very rich in mercury, which can be recognized as altered Livingstonite.

Many specimens of this mineral are exhibited by its discoverer. A large collection of rocks imbedded with Livingstonite has been sent also, by Mr. Juan Martinez, from Huitzuco. In proportion to the quantity of Mercury obtained from the deposits of Huitzuco, the price of that mineral has been lowered, thus increasing the explotation of some silver mines which was limited, owing to the high price of the mercury imported, and to the extensive application of it in the metallurgical process of amalgamation.

OPALS.

Fire and precious opals are profusely met with in Mexico. The former, in the districts of Zimapan, Esperanza, and others; the latter only in those of Esperanza, Amealco and Real del Monte. Worthy of notice is the specimen of precious opal sent by the Mining School of Mexico. It has a charming variety of colors, and is imbedded in a mass of siliciferous porphyry which contains a large quantity of nodules, formed by opals, or by strata resembling onyx. The principal varieties of opals found in Esperanza are the Mexican, Hungarian, "*Girasol*," Milky and Harlequin. The Mexican variety is notorious for their emerald, green, and copper-red tints.

SILVER.

Mexico has been always noted for its silver riches. This metal is found almost all over the country, in its native state, as well as in the form of Sulphid, Chlorid, Bromid, Iodid, Arsenid, Antimonid, and also mixed with Galenite, Blend and the Pyrites, in different proportions.

Several of the argentiferous collections displayed in this section are very striking. That from Zacatecas, for instance, distinguishes

itself on account of the large proportion of native silver, Pyrargyrite and Polybasite which it contains. The veins in this mineral District are imbedded in a formation of metamorphic slates and greenstone, and the specimens sent to the Exhibition from it belong to the mines called El Refugio, El Bote, Quebradilla, Carniceria, Varones, and Malanoche.

Mr. Miguel Rul exhibits very rich minerals from the State of Guanajuato, resembling in their characteristics those from Zacatecas, but being much richer than the latter in argentite and sulphurous silver. The rocks accompanying Mr. Rul's collection, are metamorphic slates and dioritic porphyries.

The "Real del Monte Company's collection has some mineralogical characteristics. Galenite, Argentite, and oxides of manganese predominate in it. The gangues are formed, in their greater portion of silicates and carbonates of manganese. A silicate known as Bustamite, is peculiar to the Mining Districts of Real del Monte. The veins are situated there in mountains of metaliferous porphyries.

The collection from the mine of Angangueo (State of Michoacan) is noticeable by the large quantity of argentiferous pyrites which it contains.

The exhibition of the Mexican Mining Society consists of a collection of argentiferous minerals from various localities of Mexico, among which are more remarkable those from Taxco (State of Guerrero), and Zacualpan, (State of Mexico). Taxco minerals abound in Pyrargyrite; those from Zacualpan contain argentiferous Galenite and incrustations of native silver.

A mass of quartz, impregnated with Bromirite, weighing 1075 lbs., is exhibited by the National Museum of Mexico. It was extracted from the vein of "El Refugio," in the district of Catorce, (State of San Luis Potosi.)

The School of Mines exhibits a noticeable specimen of Proustite and a collection of minerals and rocks from the district of Catorce, a locality where Bromyrite and Cerargyrite is very abundant.

Mr. Federico Farrugia Manly's collection, which illustrates the metallurgical system used in Zimapan, State of Hidalgo, contains large and valuable specimens of tetrahedrite, galenite, hydroxides of iron with cerusite and fluorine. All those minerals come from the

mines of Zimapan, where the argentiferous and lead minerals, and those which are used in the melting process, are found associated with each other.

Mr. Farrugia's collection is important not only as an illustration of the mineral character of the district of Zimapan, but also because it gives a clear idea of the metallurgical system used in that district.

A huge piece of pure silver, exhibited by Don Pio Bermefillo, is the last in the metallurgical collection displayed in the Mexican Department. This mass weighs 4002 pounds, and its value is $72,000.

SULPHUR.

The deposits of sulphur are very common, in Mexico. Prof. Castillo has enumerated the following, in a report published four years ago. Popocatepetl, Yxtlacihuatl and Tamascalungo, in the State of Mexico; Guascaman, (State of San Luis Potosi) Mapimi, (State of Durango;) Taximaroa (State of Michoacan); San Marcial, (State of Sonora,) Xilitlilla, State of Queretaro; Tlaliozantitlan, and Zumpango, State of Guerrero, Teziutlan, and Atlixco, (State of Puebla,) Volcano of Orizaba, (State of Vera Cruz; Volcano "De las Virgenes" (Territory of Lower California), and Nieves, (State of Zacatecas.)

The magnificent specimens which are seen in the Mexican display come from the volcano Popocatepetl, situated in the cordillera, South-east of the Valley of Mexico. All the bottom of its crater can be considered as a deposit of sulphur: it has several vents from which sulphurous vapors come out and are condensed on the walls of the rocks, and in some apparatus which are placed there to obtain the sulphur. There are also in the crater of this volcano large quantities of impure sulphur, which are carried to the ranch of Tlamacas to purify them by distillation. The extractions are made between the months of February and June, and the average of quintals obtained is 1,700; but this can be increased in proportion with the demands of industry and commerce.

When the sulphuric deposits of Guascaman are worked out with some activity, produce 1,000 quintals per month, this being by

no means the largest quantity that can be extracted from these deposits.

SILICATES.

Very interesting is the collections of silicates exhibited by the National Museum of Mexico. There are in it large groups of crystals of apophylite of a rosy color which come from the Valenciana Mine, (State of Guanajuato,) and some samples of garnets of the color of the peach tree flower. To this Museum belongs, also, a piece of obsidian weighing 250 pounds.

COAL.

There exist in Mexico abundant deposits of anthracite, coal, bitumen and graphite. The beds of Yzucar, State of Puebla, and those of Zempoal, State of Vera Cruz, are about to be worked on a large scale. The Yzucar deposits have the advantage, that they are situated at a short distance from the railroad of Puebla, which, being connected with that of Vera Cruz, facilitates the transportation to that harbor.

Zempoal coal is very bituminous and excellent for the manufacture of illuminating gas.

According to the analysis made by Prof. Kimbal, the coal from Zempoal has the following composition:

Volatile matter.	Illuminating gas,	61.32	62.14
	Sulphur, .	0.46	
	Water .	0.36	
Coke.	Fixed Carbon,	31.63	37.86
	Sulphur, .	0.37	
	Ash, .	5.86	
Specific gravity, ...			1.15

The chief member of the Zempoal Company is Mr. Estevan Zenteno, who resides in Tampico.

Specimens of coal from Zempoal and Yzucar are exhibited towards the center of the Mexican Department. Mr. P. Monroy has made the following analysis of the coal found in some localities of Mexico.

Coal from Pamico, State of Vera Cruz.

Composition.

Fixed Carbon, . . .	55.512
Volatile matter, . . .	43.390
Ashes, ...	1.098
	100.000
Its specific gravity, . . .	1.21

Mineral coal from Xilitla, State of Hidalgo.

Composition.

Fixed Carbon, . . .	60.400
Volatile matter, . . .	35.670
Ashes, ...	3.930
	100.000
Specific gravity, . . .	1.18

Coal from Jalapa, State of Vera Cruz.

Composition.

Fixed Carbon, . . .	52.074
Volatile matter, . . .	33.228
Ashes, ...	14.698
	100.000
Specific gravity, . . .	1.35

Coal from Yahualica, State of Hidalgo.

Composition.

Fixed Carbon, . . .	42.569
Volatile matter, . . .	42.313
Ashes, ...	15.118
	100.000
Specific gravity, . . .	1.23

Lignite from Xilitla, State of Hidalgo.

Composition.

Carbon,	31.170
Volatile matter,	45.800
Ashes,	23.030
	100.000

Lignite from Chilpancingo, State of Guerrero.

Composition.

Fixed Carbon,	33.000
Volatile matter,	49.890
Ashes,	17.110
	100.000
Specific gravity,	1.470

Lignite from Paso del Norte, State of Chihuahua.

Composition.

Fixed Carbon,	32.080
Volatile matter,	28.600
Ashes,	39.320
	100.000
Specific gravity,	1.71

Lignite from Texmelucan, State of Puebla.

Composition.

Carbon,	23.790
Volatile matter,	58.200
Ashes,	18.010
	100.000
Specific gravity,	1.76

Lignite from Zacualtipan, State of Hidalgo.

Composition.

Carbon, ...	38.618
Volatile matter, . . .	57.105
Ashes, ...	4.277
	100.000
Specific gravity, . . .	1.50

Coal is also found in large quantities in that region of the country named La Huasteca.

GRAPHITE.

Specimens of Mexican graphite, under the form of crystalline laminæ, form a part of Mr. Farrugia's collection. This graphite is very pure, and is profusely found in the district of Molango, State of Hidalgo. It is not long since Mr. Farrugia found those abundant deposits of graphite, and it is to be hoped that, when it is known in the foreign markets, it will be appreciated for the manufacture of pencils, crucibles, etc. The collection of the College of Mines contains fragments of compact graphite which come from Animas (State of Sonora).

SALINE EARTHS.

The saline earths exhibited in the Mexican section come from the southern portion of the State of Jalisco. Easily can be distinguished three groups of these earths remarkable for their composition.

1st. Rich in sexquicarbonate of soda and chloride of sodium.

Composition.

Soda combined with carbonic acid, .	21.60
Carbonic acid, ...	18.80
Chloride of Sodium, . . .	27.50
Sulphate of Soda, . . .	8.20
Earthy matters soluble in water, .	10.20
Water, ...	13.70
	100.00

2d. Rich in sulphate of soda.

Composition.

Chloride of Sodium,	5.60
Chloride of Magnesium,	8.20
Sulphate of Soda,	26.50
Sulphate of Lime,	2.50
Earthy matters,	44.80
Water,	12.40
	100.00

Earths belonging to the third group are worthy of notice, by containing 90 per cent. of Chloride of Sodium.

The earths alluded to come from tracts of land in the State of Jalisco belonging to Mr. A. Mier (City of Mexico). The water of those regions contains large quantities of salts of sodium, which are very easily extracted and sold at very low prices.

Saline earths are profusely found also in the States of Zacatecas, San Luis Potosi, the Valley of Mexico and several other localities. Those of the valley of Mexico are very rich in Carbonate of Soda and Chloride of Sodium. These earths are known in Mexico under the name of Tequezquite, and are largely used in the manufacture of soap and glass, and in the fusion of Minerals.

Decorating and Building Stones, Clays, Mexican Onyx.

The Calcareous rocks known as "Mexican Onyx" have deservedly excited the admiration of all visitors to the International Exhibition. Several characteristic properties constitute the beauty of these rocks, the most striking being the variety and charm of their colors, the remarkable contrasts of their opacity and translucency, and their aptness to obtain a high degree of polish. Red, green, yellow, violet, gray colors and all imaginable half-tints and shades are blended in the most fantastic manner. Translucent and opaque spots forming capricious views, even in very small pieces wonderfully increase the beautiful look of the slabs which, when polished, attain an exceptional degree of beauty. The specimens exhibited in the Mexican Department, account for the impression which has induced the American as well as the European ar-

tists to say, with enthusiasm, that "the Mexican Onyx is the connecting link between the precious stones and the marbles."

The composition and physical properties of this rock place it in the group and species of calcite and in the variety called onycite; it is very similar to the silicious or true onyx and hence its name.

Some specimens of the applications of Mexican onyx to industrial art are exhibited in the Mexican display, as well as in several other departments of the Main Building.

The beds of Tecali, where the specimens alluded to, come from, are the largest in the country and the most remarkable on account of the multiplicity of colors of the rocks, and the large size of the blocks that can be extracted. A monolite measuring 43 cubic feet and several slabs of large dimensions, are on exhibition. All the display of Mexican onyx has been made by the Tecali Company of Mexico, whose representative is Mr. Julian Gutierrez (City of Puebla, Mexico.).

Mr. Mariano Barcena, of Mexico, made, two years ago, a thorough study of these rocks, and their physical characteristics and chemical composition, as published by him, are the following:

Hardness,	4.50
Density,	2.90

Composition.

Lime,	55.00
Magnesia,	1.25
Water, oxides of iron and manganese,	0.10
Carbonic acid,	42.40
Sulphuric acid,	1.25
	100.00

The foregoing results were obtained from the variety of the purest white color.

MARBLES.

Several specimens of Travertine and spotted marbles are exhibited towards the centre of the section, some of them being very remarkable for their beauty.

The principal exhibitors of this kind of rocks are Mr. Bocanegra from San Luis Potosi, the local government of the State of Mexico and the National Museum.

ALABASTER.

Alabaster or sulphate of lime is found in several states of Mexico. The specimens shown come from the State of Nuevo Leon.

ARCELLITE.

The specimens of spotted and yellow Arcellita come from Zumpango, and the State of Guanajuato. That from the last mentioned locality contains a large quantity of clay. It has a wooden color and is profusely fonnd in the City of Leon, where there are mauy buildings constructed with it.

SANDSTONE.

There are in the State of Guanajuato large beds of handsome sandstone of which specimens were sent to the Exhibition by Mr. Luis Robles Pezuela. This rock is largely employed in the finest constructions in Guanajuato City.

VOLCANIC ROCKS.

A remarkable collection of well-cut specimens of volcanic rocks used as building material in the City of Mexico, was sent to the Exhibition by the School of Mines. In the vicinity of this city there are several mountains formed of trachytic porphyries and of volcanic lava, largely used in rural buildings. The trachytic porphyries are of clear colors and have a proper texture for polishment. Among them is very remarkable, the one known under the name of "Chiluca"; a great part of the magnificent building of the School of Mines is constructed with this rock. The lavæ ("tezontle") are very porous, and, as the calcareous cement penetrates them with ease, form afterwards compact masses of long duration.

CLAYS.

From the State of Mexico comes several cubes of white clay which have the aspect and composition of Kaolin. From the deposists of clay in the State of Guanajuato, there are on exhibition,

some specimens belonging to the collection of the National Museum of Mexico. There are in that State very important beds of white clay, with which porcelain of excellent quality is manufactured.

Banks of clay are found in many localities of Mexico, especially where mountains of porphyry or other feldspar rocks exist.

GEOLOGY.

Geological studies, so important for their connection with mining and agriculture have been taken up in Mexico with very good results. Many important data have already been compiled for the formation of the geological chart of the country, and recently some surveys have been made with the same object.

It is a year since the government of the State of Mexico organized a commission in order that the geological chart of the State should be drawn up. At present, the map of the district of Zumpango, in that State, is already made by the engineers, S. Ramirez and J. Cuataparo. The explicatory memoir and the map can be seen in the Mexican Department.

At the expense of the General Government, too, surveys in the Sierra of Queretaro and in the State of Jalisco have also been made with the purpose of noting down a greater number of facts about Mexican Geology.

Among the specimens on exhibition there are some samples of new species of characteristic fossils and rocks of mesozoic formations in Mexico. Accompanying this collection is found a printed explanation and some maps. Their exhibitor is Prof. Mariano Barcena.

In the month of February, 1875, in Guadalajara, capital of Jalisco, and in the surroundings, some frequent subterranean noises were heard. With the purpose of studying these phenomena the Minister of the Interior organized a commission formed of the engineers, Messrs. Yglesias, Mariano Barcena, and Juan Matute. Careful explorations were practiced in that locality, as well as in the volcano Ceboruco, situated in the same State of Jalisco. The opinion stated in the report published by the commission is, that the earthquakes had no connection whatever with the noises heard in the points already mentioned. Accompanying this work are photographic views and topographic plans of the volcano, a seismo-

logical chart in which are marked the directions of the earthquakes and an account of all their phenomena which had been observed in Jalisco since the Conquest to the present time. Prof. Barcena exhibits a specimen of that document, and several views and plans and a collection of rocks belonging to all the eruptive periods of the volcano Ceboruco. The rocks of the present eruption are trachytic porphyries, of base of peach-stone, and somewhat similar to those produced at present by the volcanoes of the Hawaii Islands.

The Valley of Zumpango, from which have been extracted numerous remains of elephas, mastodon, equus, glyptodon, and other post-tertiary animals, is at present the object of careful studies. Drawings of the projects adopted to drain the valley of Mexico are exhibited in the left hand side of the office of the Mexican Commission.

MANUFACTURES.

As already stated, in the introductory remarks, the manufactures sent to the exhibition by Mexican industrials, do not represent by any means the whole development to which the manufacturing industry of Mexico has arrived. Nevertheless, some brief explanations about several of the articles which fill this section will be of interest.

CHEMICAL PRODUCTS.

The organic compounds extracted from the plant called "Trixis Pipitzahoac," viz.: the Pipitzahoic Acid and the Pipitzahuina, are interesting, not only because of their novelty but of their prospects of future usefulness. The former ought to be considered as one of the most beautiful vegetable products. It is of a brilliant, golden color, and of a soft, silky texture, being obtained either in an amorphous state, or crystallized in small prisms and laminæ. At present, Pipitzahoic Acid is employed in medicine as a drastic purgative, and it can be used as a coloring matter. Its price in Mexico is 11 cents a gramme.

Pipitzahuina is of a white color. It is fusible and volatile at over 100° C. Crystallizes in prismatic needles when treated by sublimation, and its crystals assume the laminar form when obtained by evaporation. It is insoluble in water, soluble in ether and chloroform. The two new substances alluded to were discovered, the first by Prof. Don Leopoldo Rio de la Loza, and the second by D. Severiano Perez, both Mexican chemists.

Worthy of mentioning is the substance designated by Prof. Alfonso Herrera with the name of Tebetosa. It is a substance belonging to the class of the *Glucosidæ.* Crystallizes in four-sided prisms; is inodorous and exceedingly sour, being insoluble in water, and the *Sulphide of Carbon,* but soluble in alcohol. The

"Tebetosa" is extracted from the seeds of the Thevetia Iccolli, which plant belongs to the Apocinaceæ family.

In this connection is to be mentioned a very interesting sample-board containing the blow-pipe-test of the argentiferous minerals of the State of Guanajuato, as obtained by Prof. Severo Navia.

SALTS OF SODIUM.

The extraction and preparation of Salts of Sodium is in Mexico an interesting industry. These salts are present in the waters and earths of several lakes and localities of the country, being very abundant in the lakes of the valley of Mexico. Near to these lakes there are factories in which these products are extracted, the most extensive being that belonging to Mr. Guillermo Hay, who has sent to the exhibition several specimens of Carbonate, Sulphate of Soda, and of Chloride of Sodium. Some other manufacturers of chemical products in the neighborhood of Mexico sent samples of salts of sodium, among which those prepared by Messrs. Maximino y Manuel Rio de la Loza may be mentioned. But the States of Yucatan, Campeche, and Colima ought not to be overlooked, as they produce immense quantities of this kind of products.

Class 201.—OILS.

Several samples of oils have been exhibited in the Mexican Section, among which, the more valuable, because of their extensive use, are those of Olives, Mamey (Lucuma Bonplandii), and Coquito.

Olive oil is extensively prepared in several states of the country, specially in that of Guanajuato and the Federal District. The samples on exhibition were sent by Mr. Eduardo Cañas, who has a large factory near the City of Mexico. The oil of Mamey is exhibited by the Society of Natural History. It is obtained from the almonds of the "Lucuma Bonplandi," in the proportion of 40 per cent., by means of pressure, aided by a high temperature. This oil is employed in the manufacture of soap, cosmetics, and for illuminating purposes. From the almond of a fruit produced by a palm tree (genus Elaïs), is extracted the so-called "coquito oil." This

oil solidifies at the ordinary temperature of the Central portion of the country. It is used in the manufacture of soap, which by being of very fine quality, is suitable to toilet uses. The fruits produce 50 per cent. of oil, and are gathered in immense quantities in the States of Oaxaca, Colima, Guerrero, and others.

Class 202.—PAINTS, DYES, &c.

Samples of very fine indigo were sent from the States of Yucatan, Oaxaca and Colima, where this product is obtained in very large quantities.

Class 203.—ESSENCES, PERFUMES, &c., &c.

Among the aromatic extracts sent from Mexico, occupy a prominent place, those of Linaloe (Amyris Lignaloes), Torongil (Cedronella Mexicana), and Eucalyptus Globulus, prepared by Mr. Rio de la Loza.

Worthy of calling the attention upon are the aromatic extracts prepared by Mr. A. Morrill, and exhibited in company with those of Messrs. Rio de la Loza, in the second section of the Mexican Department.

Several samples of essential oils, of balsams and resins were also sent by the Society of Natural History. The most noticeable being that of Anicillo (Schkuhria Abrotanoides), the black balsam extracted from the "Myrosphermum Pereiæ" a tree growing on the coasts. Among the resins, those which deserve a particular notice, as being highly perfumed, are those of Amyris Lignaloes, Liquid-ambar, Styraciflua, and several species of the Elaphrium.

One of the aromatic substances more valuable in the Mexican Section, is the magnificent Vanilla bean exhibited in large amount by Papantla growers (State of Vera Cruz). This precious vegetable fruit of Mexico has already been awarded premiums in the Exhibition of Paris and Vienna.

POTTERY, GLASS, ARTIFICIAL STONES, &c.

The firm Alexandre Casarin and Co. of Mexico exhibit a rich collection of vases imitating the Aztec, Egyptian and Chinese styles.

The imitation is perfect, and it can be said that Mr. Casarin's vases, where the polygonal lines, the serpents, the idols and the hieroglyphic, of the Aztecs are combined, bring forth to our memory the days of old of that historical race. He also exhibits some decorating enamels in porcelain plates.

This and several other classes of modern Indian pottery sent by the State of Morelos, as well as bricks of different qualities manufactured by Mr. Ignacio Guerrero of the city of Puebla, from the Mexican display of pottery and ceramic. Mexico has, from late, rapidly advanced in the manufacture of porcelain and kindred products. Its exhibition, therefore, of such articles, do not give by any means a complete idea of the actual state of that branch of industry.

FURNITURE.

Reed chairs after the Austrian style were sent to the Exhibition by their manufacturer, Mr. Francisco Garcia of the City of Oaxaca.

The children of the Orphans' Asylum of the City of Puebla, took their share in the International Exhibition, by sending many silverware articles.

Class 230.—YARNS AND WOVEN GOODS OF VEGETABLE, OR MINERAL ORIGIN.

Although there are in Mexico numerous and large cotton-goods factories, only some of them have exhibited their products.

The topographic peculiarities of the country affording free and rapid course to numberless running streams, are very favorable for the establishing of all kinds of machinery intended to be moved by hydraulic power.

In this connection, the samples of flax and flax-fabrics sent by Mr. J. Juarez, flax-grower and manufacturer, in the vicinity of the lake of Texcoco (valley of Mexico) are notice-worthy.

Mr. Antonio Carvajal is the exhibitor and manufacturer of the excellent galloons seen in the front of the department.

Class 236.—WOVEN GOODS.

The display of woolen goods in the Mexican Department has been made mainly by the large mills of Arroyo Zarco (state of

Mexico), and of Zempoal (state of Guanajuato). The number of this kind of factories is large enough to supply all the interior demand of the country.

SILK AND SILK FABRICS.

The growing of the silk-worm is an industry which lately has been increasing in several quarters of the country, especially near the coast of the Pacific, as for instance in Oaxaca, Guerrero, Michoacan, Colima, &c.

Don Miguel Hidalgo, hero of the Mexican Independence, taught, in the beginning of the present century, the inhabitants of Guanajuato the system of growing the silk-worm and the culture of the mulberry trees. Some of the latter planted by that venerable patriot, are still in preservation. The State of Michoacan on account of its climate, as well as of its topographical peculiarities offers the most appropriate circumstances for a large development of the silk industry.

The samples of silk seen in the Mexican section were sent by the Government of the State of Oaxaca. This State is also admirably suited to the production of silk.

There are other insects in Mexico, the larva of which makes in the forest, cocoons of the finest silk. In the *arbutus madrogno*, in the quercus and other trees, the worms of the *eucheira socialis* and other butterflies, perform the same kind of work.

Cocoons and other specimens of wild-silk of Mexico, remarkable for the brilliancy and whitenesss of their fibres have been sent to the exhibition by the Society of Natural History. The illustrious Humboldt when speaking of his travels in Mexico, relates to have obtained in Acapulco some handkerchiefs manufactured from that kind of silk.

The silk goods exhibited in the Mexican section, came from the factory established in the city of Puebla, by Messrs. Rivas & Tarradas. Its first products were awarded premiums in the national exhibition of Mexico.

CLOTHING, ORNAMENTS, &c.

Several exhibits in this section represent costumes of certain classes of the Mexican Society, although none of them is intended to give an idea of the costumes of that society at large.

To the Tailors' association of the City of Mexico belongs a "charro dress" made of buck-skin, trimmed with gold and silver bullion and with filigree buttons. This kind of dresses are used by the farmers of Mexico, and also by the most refined gentlemen of the cities when riding on horse-back. Some straw hats manufactured in Yucatan and Campeche, an Indian dress (Huipilli) and some blankets of several colors from the State of Coahuila, are seen in the same show-case. Huipillis are used by the Indians of Yucatan, especially in summer. Certain kind of blankets may be considered as an accessory characteristic of some of the National dresses.

Class 252, 53. The display made by Mexican ladies occupies the lower end of the Department. A portrait of President Grant embroidered in a silk handkerchief, has called a great deal of attention not only on account of the perfect likeness, but of that notwithstanding the thinness of the handkerchief in which the embroidery is executed, the stitches are not perceptible on the wrong side.

PAPER.

The Atemajac paper-mill (State of Jalisco) manufactures large quantities of all kinds of paper. Samples of the products of this mill are shown in the first section of the Mexican Department, in company with specimens of the paper manufactured by Messrs. Benfield, Breaker & Co., in the mill of "Belem," (District of Mexico). The products of these mills are very important ones, being consumed in almost all parts of the Republic. The paper from Belem has been awarded medals in some of the expositions of Mexico and Paris.

Among the specimens belonging to Messrs. Benfield, Breaker & Co., those made from the fibres of the "Maguey" (Agave Mexicana) plant, are very remarkable, by its whiteness, elasticity and strength. It can be used advantageously for bank-notes. The quantity of agave fibres for the manufacture of this particular kind of paper is inexhaustible, and their cost is a trifle.

MEDICINE.

Class 272.—PROTHESIS.

Under this head mention must be made of the Mexican medicinal plants, sent by the Society of Natural History, among which there are specimens of great therapeutical interest. This collection was presented to the Society by Don Alfonso Herrera (Prof. of Pharmacy), a classified list of which is given in the following pages.

CRYPTOGAMÆ. PL.

Ferns.

1. *Polypodium Lanceolatum*, L. ("Lengua de ciervo"). It grows profusely in the mountains surrounding the Valley of Mexico. Its twigs and leaves are used as pectorals and for healing wounds. Price, 25 cents per kil.

2. *Polypodium calaguala.* Schafner. ("Calaguala"). Found in large quantities in "El Pedregæ de San Angel," and other places in the Valley of Mexico. The *rizomæ* are used as diaphoretic and pectoral. Price, 50 cents per kil.

3. *Polypodium pseudo-filix-mas.* Schaf. ("Palmitas"). It is gathered in the mountains that surround the Valley of Mexico, and in other regions of the country with similar climate. It is used against tenia. Price, 50 cents per kil.

Licopodiacæ.

4. *Lycopodium nidiformis.* Fl. M. J. ("Doradilla"). Grows in the same localities with those of the Polypodium pseudo-filix mas. The whole plant is used in inflammatory affections of the liver. Price, 25 cents per kil.

MONOCOTYLEDONA.

Graminaceæ.

Andropogon citratus. D. C. "Te limon." Found in some warm places in the Republic. It is used as anti-spasmodic and as tea. Price, 50 cents per kil.

Cyperaceæ.

Cyperus rotundus, L. ("Peonia del pais"). Temperate regions. Stomachic properties are attributed to it. Price, 25 cents per kil.

Orchidaceæ.

Blettia campanulata, "La llave." ("Chaucle"). Temperate regions. The coction of this plant's pseudo-bulbs are used in dysenteries. Price, 50 cents per kil.

Melanthaceæ.

8. *Veratrum frigidum*. Schletend. ("Cebadilla"). Xochimilco Mountains. The fruit and bulbs are used to kill insects. Both contain veratrine. Price, 50 cents per kil.

Comelineæ.

9. *Comelina tuberosa*. H. B. K. "Yerba del pollo." Grows abundantly in the temperate regions. It was studied by the Mexican Pharmaceutists, Gumesindo Mendoza and Alfonso Herrera. Doctors Jimenez, Aramburo and others have confirmed the eminently *hæmostatic* properties of this plant. (Vid. "Gaceta Medica" de Mexico, vol. 3d). Price, 25 cents per kil.

Esmilacineæ.

10. *Smilax pseudo-china*. Scheide. "Cocolmecan." Warm regions. The roots enjoy the reputation of being diaphoretic and anti-syphilitic. Price, 50 cents per kil.

Dioscoreaceæ.

11. *Rajania Subsamarata*. Fl. M. I. "Cuanchalala." Warm regions. The bark used as astringent. Price, 50 cents per kil.

DICOTYLEDONA.

Coniferæ.

12. *Taxodium mucronatum*. "Parlatore." ("Ahuehuete"). Grows in the Valley of Mexico and similar places of the country. The bark is used as *emmenagogue* and *diuretic*, the leaves act topically against the itch and as resolutive. Out of the wood a liquid pitch is prepared, which is used in the treatment of several skin diseases. Price, the leaves 25 cents kil.; the bark 50 cents kil.

13. *Pinus teocote*. Scheide. ("Ocote"). It abounds in the mountains that surround the Valley of Mexico and in some other localities in the country. The turpentine produced by this tree resembles that of Bordeaux. It produces 17 per cent. of essential oil. Price, 6 cents per kil.

14. *Pinus Religiosa*. H. B. K. ("Oyametl"). The turpen-

tine produced by this tree is similar in properties to that of Venice. (Vid. "La Naturaleza," vol. 2). Price, 50 cents kil.

Urticaceæ.

15. *Urtica Mexicana.* Fl. M. I. "Yesgos." It grows in the temperate regions in Mexico. Its roots are used as diaphoretic. Price, 20 cents kil.

Cannabineæ.

16. *Cannabis Indica*, L. "Mariguana." It lives in the temperate regions. This plant is well known on account of its physiological properties. Price, 50 cents per kil.

Euforbiaceæ.

17. *Hura crepitans*, L. ("Quautlatlatzin"). A tree growing in the warm and damp regions of Mexico. Its seeds, commonly called *habillas de San Ignacio*, are used as *drastic*. They contain a 50 per cent. of fixed oil, in which are found the active properties of the grains; stearine, albuminous parenchyma, gum and salts of lime and potash. Price, $2 per kil.

18. *Euforbia maculata*, L. "Yerba de la golondrina." It grows in the temperate regions. The juice is employed to take out the stains of the cornea and the decoction in the scabies, and other skin diseases. Price, 25 cents per kil.

19. *Euforbia pulcherrima*, L. ("Flor de Noche Buena"). Grows in the warm and damp regions, and is cultivated in gardens Its bracteæ are used (8 grm. a dose) to increase the secretion of milk and its decoction as resolutive. Price. $1 per kil.

20. *Acalipha prunifolia.* H. B. K. ("Yerba del pastor"). It grows in temperate regions. The plant is used as vulnerary. Price, 25 cents per kil.

21. *Croton dioicus*, Cav. ("Yerba del zorrillo"). It abounds in the Valley of Mexico and similar regions. The seeds contain, according to the analysis made by Mr. Donaciano Morales, vegetable albumen, gum, fixed oil, resinous matter, brown substance soluble in water, cellulose and salts. An emulsion made with 20 or 30 seeds acts as a drastic; the same effect is obtained with powdered root in a 2 grm. dose. Price, seeds $1 per kil.; root, 25 cents per kil.

Aristolochiaceæ.

22. *Aristolochia grandiflora*, Swart. "Guaco." Grows in the

warm and damp regions. The roots (the only part used) contain volatile oil, resin, tannin, gum, starch, salts of lime and potash. It is applied as antidote against the poison of serpents and of other venomous animals, and also as a diaphoretic and emmenagogue. Price, $1 per kil.

23. *Aristolochia fœtida*, H. B. ("Yerba del indio"). It grows in Ario. The decoction of the leaves is used to consolidate wounds, and the root as a stimulant. Price, 50 cents per kil.

24. *Aristolochia Mexicana*, Fl. M. I. ("Tla copatle"). It is found in the State of Guerrero and other warm places. It is believed that the root has anti-spasmodic properties. Price, $1 per kil.

TYMELEACEÆ.

25. *Daphnopsis salicifolia*, Meis. ("Hojas de San Pedro.") It grows in Cuernavaca. In a region 3,200 feet over the level of the sea, according to Humboldt. The leaves are used as exutory. Price, 50 cents per kil.

LAURINEÆ.

26. *Persea gratissima*, Gaeru. ("Aguacates.") Aborigine of Mexico. It is cultiavted in orchards. The leaves and fruits are used as emmenagogues. It is commonly believed that the fruits increase the spermatic secretion and the suppuration of wounds. The *epicarpium* is used as anthelmintic.

QUENOPODIACEÆ.

27. *Chenopodium ambrosioides*, L. (Epazote.) Aborigine of Mexico. It is cultivated in the orchards. It is used as spices and in medicine as anthelmintic and emmenagogue. Pirce, 25 cents per kil.

PLUMBAGINACEÆ.

28. *Plumbago scandens*, L. Tlachichinolli. It grows in the warm and damp regions of the country. The leaves exteriorly applied act as caustics and interiorly as emetics. The root is employed with the same results. Price, 50 cents per kil.

LABIATÆ.

29. *Cedronella Mexicana*, Bent. ("Toroujil.") Grows in the temperate regions. The flowers are stimulant and antispasmodic. Price, 50 cents per kil.

VERBENACEÆ.

30. *Lippia graveolens*, H. B. K. ("Yerba dulce.") It grows in Orizaba, Cordoba, and similar places in the Eastern flowing of the Great Mexican Cordillera. According to Mr. Maximino Rio de la Loza, this plant has a peculiar sachariferous principle, which is volatile and soluble in water and alcohol, some volatile oil, an stearopten vary similar to that from Japan, chlorofille, woody substance and salts. The infusion of this plant is used as pectoral and emmenagogue. Price, 50 cents per kil.

31. *Lippia citriodora*, Kurst. ("Cedron.") It is cultivated in gardens. The infusion of the leaves is used as antispasmodic. Price, 50 cents per kil.

32. *Lippia callicarpœfolia*, H. B. K. ("Salvia real de Puebla.") It grows in Puebla. The inflorecences and leaves are used as stimulants. Price, 50 cents per kil.

SCROFULARIACEÆ.

33. *Budleia verticillata*, H. B. K. ("Mispatle.") It grows in the temperate regions. The leaves are believed to be vulnerary. Price, 25 cents per kil.

34. *Budleia globosa*, Lam. ("Salvia real de Mexico.") Grows in the temperate regions. General stimulant. Price, 37½ cents per kil.

SOLANACEÆ.

35. *Nicotiana glauca*, Grah. ("Tabaquillo.") Abounds in the temperate regions. It is said to have the same properties as nicotiana tabacum. Price, 25 cents per kil.

BORRAGINACEÆ.

36. *Tournefortia Mexicana*, Cerv. ("Tlachichinoa.") Grows in the warm regions. It is employed against the itch and ulcers of the mouth. Price, 37½ cents per kil.

CONVOLVULACEÆ.

37. *Ipomœa murocoides*, H. B. ("Palo del muerto.") Warm regions. The decoction of the wood is used as a bath in paralytic patients. Price, 18 cents per kil.

38. *Exogonium purga*, Benth. ("Jalapa.") It grows on the Eastern side of the Mexican Cordillera. Cathartic. Price, $1.50 per kil.

BIGNONIACEÆ.

39. *Crescentia alata*, H. B. K. ("Cuautecomate.") Grows in warm and damp regions. The fruit contains a large quantity of sugar, gum, tannin, cellulose and salts. The fruits are considered to be eminently pectoral. Price, 12½ cents per kil.

POLEMONIACEÆ.

40. *Hoitzia Cocineœ*, Gavan. ("Espinosilla.") Grows in temperate regions. According to Oliva, it contains resin, tannin, gallic acid, a bitter extractive, green coloring matter, sacchariferous substance, woody matter and salts. The infusion is used as a diuretic, diaphoretic, and in a large dose, as emetic and cathartic. Price, 12 cents per kil.

ACANTACEÆ.

41. *Sericographis mohintli*, D. C. ("Muitle.") Grows in Jalapa and in similar regions. The leaves contain an amorphous coloring matter of a very dark blue. It resembles the sun-flower, but its coloring substance is far superior to the last mentioned flower. Price, 25 cents per kil.

GENTIANACEÆ.

42. *Erythrea stricta*, Scheide. ("Canchalagua.") Grows in warm regions. It is a bitter tonic. Price, 50 cents per kil.

ASCLEPIADACEÆ.

43. *Asclepias setosa*, Bent. ("Contrayerba de Julimes.") Grows in temperate regions. It is employed as a tonic and diaphoretic. Anti-periodical properties are attributed to it. Price, 50 cents per kil.

44. *Asclepias linearis*, L. ("Romerillo.") Is profusely found in the Central Plateau. The milky juice and the leaves of this plant are used as a powerful emetico-cathartic. The seeds have a very soft hair which can be used with the same purpose as the eider-down. Price, 25 cents per kil.

APOCINACEÆ.

45. *Thevetia iccotli*, D. C. ("Yoyote.") Is found profusely on the Western side of the Great Mexican Cordillera. It contains, according to Prof. Herrera's analysis, fixed oil, vegetble caseine, an

extractive matter, a glucoside, which this Professor called tevetosa, and salts. The seeds have 40 per cent. of oil; their density is 0.9100 at 20° C.; at 10° it becomes muddled, and at 0° it concretes partially. With sulphuric acid it takes a yellow color, which becomes rosy and afterwards orange-red. It is not drying, and it seems to be composed of oleine and margarine. The active principle of the Thevetia is the tevetosa. Price, seeds, 50 cents per kil.; oil, $1.00 kil.

SAPOTACEÆ.

46. *Sapota achras*, Mill. "Chicozapote." Grows abundantly in the warm and damp regions of the Republic. The bark of this tree is used as anti-periodical. The seeds, deprived of their episperme, are used as diuretic, at a dose from 6 to 12 seeds, since in a greater quantity, it is said, to produce toxic effects. Around the grain there is a resinoid substance, called chicle, which is white, and easily becomes soft between the fingers. It is used to make small sculptures and as a masticatory. Price, bark, 25 cents; seeds, 50 cents, chicle, 50 cents per kil.

47. *Lucuma salicifolia*, Kunt. ("Zapote borracho") Is found in warm regions. The bark is used as anti-periodic. It is believed that the fruits, the pericarpium of which is eatable, exercise a wonderful action on the brain. Price, bark, 25 cents per kil.

ERICACEÆ.

48. *Arctostaphylos pungens*, Kunt. ("Pingüica.") Grows in temperate regions. According to Oliva, the leaves contain tannin, gallic acid, gum, chlorophille, cellulose, a coloring matter, together with tannin, resin and salts. The fruits and leaves are used as diuretic. Fruit, 25 cents, and leaves 25 cents per kil.

COMPOSITÆ.

49. *Solidago montana*, Fl. M. I. (Calancapatle) grows in the Valley of Mexico. The leaves are used as vulnerary. Price 12 cents per kil.

50. *Gnaphalium canescens*, D. C. (Gordolobo,) is abundant in the Mexican Plateau. The flowers have astringent properties. Price, 25 cents per kil.

51. *Artemisia Mexicana,* D. C. (Estafiate.) Found in the Valley of Mexico. It contains according to Mr. L. Rio de la Loza extractive, nitrogenous resinoid substances, both very bitter; chlorofille, albumina, fæcula, volatile oil and diverse salts. The leaves have tonic stimulant, emmenagogue and anthelmintic properties. Price, 12 cents per kil.

52. *Athanasia amara,* Cerv. "Prodigiosa." Temperate regions. The leaves have tonic and vermifuge properties. Price, 12 cents per kil.

53. *Apoplapus discoideus,* D. C. (Damiana.) It grows in the Valley of Mexico. The whole plant is used in baths against rheumatism. Price, 12 cents per kil.

54. *Sanvitalia procumbens,* D. C. "Ojo de gallo. It grows in abundance in the Central Plateau. The decoction of the whole plant is used as a peptic. Price, 12 cents per kil.

55. *Montagnœa tomentosa,* D. C. "Zoapatle." It grows in the Chapultepec woods and other places in the Valley of Mexico. According to Mr. Federico Altamirano, the leaves contain albumina, gum, chlorofille, greasy matter, extractive, two resins, a gray, yellow, bitter, neutral substance, a peculiar acid, soluble in water and alcohol which gives a yellow precipitate by the action of lead and other salts. The juice and decoction of this plant provoke the contractions of the womb.

56. *Eupatorium collinum,* D. C. ("Yerba del Angel.") Guadalupe Range, north of the Capital. The decoction of the leaves is commonly used in atonic diarrhœa. Price, 12 cents per kil.

57. *Erigeron affine,* D. C. "Peritre," Valley of Mexico. The roots are used as *sialogogue.* Price, 25 cents per kil,

58. *Senecio canicida,* Fl. M. I. "Yerba de la Puebla." It grows in the State of Puebla. Mr. M. Rio de la Loza has extracted from this plant a volatile acid, which he has called *senecio,* to which he attributes the tetanic properties of the plant. It is used as antiperiodical and diaphoretic. Price, 25 cents per kil.

59. *Echinacea heterophilla,* Don. "Raiz del manso." It grows in El Pedregal de San Angel (Valley of Mexico.) According to Mr. Cal, the root contains, resin 12,11, gummy substance 15,62, extractive matter 46,87, woody substance 23,06, loss 2.34. It is commonly used for healing wounds. The decoction is used in dysenteries, and its juice in fractures the same as dextrina.

60· *Trixis pipitzahoac*, Schaffner. "Pipitzahoac." In the Valley of Mexico and in the Western mountains. The *rizomæ* and roots contain a resinous substance which Mr. L. Rio de la Loza has called *pipitzoic acid.* It is used as drastic in a dose of from 4 to 8 grains.

VALERIANACEÆ.

61. *Valeriana Mexicana*, D. C. ("Yerba del gato.") Grows in the Valley of Mexico. The root contains valerianic acid and not any essential oil, a resin, fæcula, woody substance and salts. It is anti-spasmodic. Price, 25 cents per kil.

62. *Sambucus Mexicana*, Priestl. "Sanco." It grows in the temperate region in the Republic. The flowers are used as stimulants and diaphoretics. Price, 25 cents per kil.

CACTACEÆ.

63. *Opuntia nopallilo*, Karwins "Nopalillo." Temperate regions. The common people use the coction of the root against dysentery, diarrhœa, *hæmoptysis* and *metrorrhagia.* Price, 12 cents per kil.

PASSIFLOREÆ.

64. *Passiflora dictamus*, Fl. M. I. "Dictamo real." Warm regions. The coction of this plant is commonly used for several diseases of the respiratory organs. Price, 50 cents per kil.

65. *Myrtus Arrayan*, Kunt, ("Arrayan") Temperate regions. The leaves are used as tonics and astringents. Price, 25 cents per kil.

ROSACEÆ.

66. *Cerasus capollin*, D. C. "Capulin." It is cultivated in the orchards. The bark is used as anti-periodic and in the treatment of dysentery. The leaves contain prussic acid, and are used as succedaneous of the cherry-laurel. Price, bark 50 cents per kil; leaves 25 cents per kil.

67. *Cratægus Mexicana*, Mocino y Lesse. ("Tejocote.") It is cultivated in the orchards. The decoction of the fruits is used as pectoral; that of the roots as diuretic. Price, fruits 6 cents per kil; roots, 50 cents per kil.

LEGUMINOSEÆ.

68. *Dolichos tuberosa,* Lamark, "Jicama," is found in warm regions. The dyeing, prepared with grains of this vegetable, has powerful antipsoric properties. The tubercles are eatable. Price, seeds 50 cents per kil.

69. *Dalea citriodora willd.* ("Limoncillo.") Valley of Mexico. The whole plant is used as anti-spasmodic. Price, 12 cents per kil.

70. *Tamarindus occidentalis,* D. C. ("Tamarindo.") Warm and damp regions in Mexico. The fruit is laxative. The price, 6 cents per kil.

71. *Hymenea courbaril,* L. "Cuapinole." It grows in the State of Oaxaca and Guerrero. Its resin is used for varnishing. Price, $2.50 per kil.

72. *Eysenhartia amorphoydes,* D. C. "Palo dulce." On the Central table land. The coction of the wood is diuretic; the maceration as prophylactic in the epizoöty of chickens. Price, 12 cents per kil.

73. *Myrospermum Pereiræ,* Royle. "Balsamo." In the State of Morelos and other warm and damp places in Mexico. The fruit and barks of this tree are used to prepare a dyeing, and employed as balsamic and stimulant. Price, seeds 18 cents; bark, 12 cents.

74. *Cæsalpinia cacalaco,* H. B. K. "Cascalote." Warm and damp regions. The fruits are very rich in *tannin* and gallic acid, are used as stringent and to tan skins.

75. *Prosopis dulcis,* Kunt. "Mezquiite." Central Tableland and other places. The gum it produces, looks very much like the Senegal and Arabian gum. They are used for the same appliances as the latter. The price according to the classes; the whitest 50 cents per kil.

76. *Acacia albicans.* "Huisache." Table land. The fruits are used as astringent and as *succedaneous* of the gall nuts. Price, 25 cents per kil.

RIZOFORES.

77. *Rhizophoro mangle,* L. "Mangle." On the coast of the Gulf of Mexico. The gum of the tree is used as pectoral. Price, 25 cents per kil.

LITRARIEÆ.

78. *Cuphea lanceolata,* H. B. K. Atlanchana. Valley of Mexico. They use the whole plant as corroborative for women lately delivered.

79. *Heimia salicifolia*, Link, "Hanchinol." In the State of Mexico. Diuretic, diaphoretic and antisyphilitic. Price, 25 cents per kil.

TEREBINTHACEÆ.

80. *Amiris lignaloe*, L. "Linaloe." Explained elsewhere.

81. *Schinus molle*, L. "Peru." Explained elsewhere.

RUTACEÆ.

82. *Zantoxylum pentanome*, D. C. "Palo mulato." In the Valley of Mexico. The wood and bark are used as stimulant and tonic. Price, 25 cents per kil.

AMPELIDEÆ.

83. *Cissus tiliacea*, H. B. K. "Tripa de Judas." Table-land. The coction and dyeing of the chits of this plant are used against rheumatism. Price, 25 cents per kil.

ZIGOFILACEÆ.

84. *Zygophyllum fabago*. L. "Gobernadora." Temperate regions. The leaves are used in bathing to cure arthritic pains. Price, 25 cents per kil.

MALVACEÆ.

85. *Malva angustifolia*. Cav. "Yerba del negro." Table-land. Leaves and roots are emollients. Price, leaves 25 cents; roots 25 cents per kil.

MAGNOLIACEÆ.

86. *Magnolia Mexicana*, Mocino y Sessie. Grows in the State of Morelos.

The flowers contain essential oil, green resin, quercitrine, *tannin*, extractive and salts. The infusion of the flowers is used as antispasmodic, and the tincture as tonic. Price, 50 cents per kil.

EDUCATION AND SCIENCE.

EDUCATIONAL SYSTEMS—LIBRARIES.

Class 304. *Educational Reports and Statistics.*

Mr. Jose Diaz Covarrubias, Assistant Secretary of Education, has recently published a work entitled, "The Public Instruction in Mexico," in which he furnishes very interesting data on this subject. He makes, besides, comparative studies of the different educational systems of foreign countries, painting out at the same time the superiority to be attached to some of them.

To give an idea of the data contained in the aforesaid book, we take the following:

In Part I. Mr. Covarrubias examines the question of compulsory primary instruction, adopted now in seventeen States, in the Federal District and Territory of Lower California. He discusses the principle itself, and urges its adoption by the whole country.

In giving an account of the present condition of primary education, systems of teaching, &c., states that the primary schools are distributed over the country in the following manner:

States.	*No. of Schools.*
Aguascaliente	66
Campeche	72
Coalmila	115
Colima	48
Chiapas	100
Durango	150
Guanajuato	403
Guerrero	455
Hidalgo	479
Jalisco	714
Mexico	721
Michoacan	233
Morelos	200
Nuevo Leon	278
Oaxaca	427

Puebla	1008
Queretaro	98
San Luis Potosi	253
Sinaloa	281
Sonora	129
Tabasco	38
Tamaulipas	60
Tlaxcala	202
Vera Cruz	500
Yucatan	194
Zacatecas	382
Federal District	354
Lower California (Territory)	5
Total,	8103

Out of these schools 5567 are for boys alone; 1594 for girls; 548 for boys and girls; 124 for male adults; 21 for female adults, and 249 without any special programme. The yearly expenses for primary instruction amount to $2,784,168.

A map at the end of the work referred to shows the development of primary instruction in Mexico.

The primary instruction in the Federal District comprises, reading, Penmanship, Elementary Grammar, Arithmetic, Metric System, Drawing, Geography, Moral, Urbanity and Hygiene. The girls are taught the same branches, with the addition of handiwork peculiar to their sex.

Primary and secondary as well as professional education, are earnestly promoted by the government. The order of studies, the examinations and conferring of professional titles or degrees, are regulated by especial laws; the following being the degrees conferred by the State: School Teachers, Doctor of Medicine, Professor of Pharmacy, Professor of Veterinary, Professor of Agriculture and other titles on all engineering branches.

There are 54 professional and secondary schools under official control, 12 of which are established in the capital, and the rest in the States. The students attending these schools number 9337, besides 3800 who receive instruction in similar religious institutions. The annual expenses of secondary instruction amount to $1,100,000.

The National Preparatory School, established in the City of Mexico, fits students in all the branches required for entering any professional career. These branches consist in Mathematics, Physics, Astronomy, Chemistry, Geography, History, Natural History, Logic, Rhetoric, Grammar, Moral Sciences, Literature, Greek, Latin, English, French, German and Italian. There are laboratories of Physics, Chemistry and Natural History. The students that attended this school in 1874, numbered 602.

The following are other secondary and professional schools found in the capital: "School of Arts and Trades" for men, "Reform School" for boys, "Law School," "Medical School," "School of Engineering," "School of Fine Arts," "School of Agriculture," "Commercial School," "Military School," "Deaf and Dumb Asylum," "Blind Asylum," "Secondary School" for girls, "College La Paz" for girls, "Conservatory of Music and Declamation."

Mr. Covarrubias describes the 40 public libraries found in the Republic, museums and kindred institutions. Three of these libraries are established in the capital and contain 236,000 volumes. Museums of antiquities, natural history and fine arts are found in the capital, Campeche, Oaxaca, Yucatan, Puebla and Guadalajara.

Class 305. *Libraries, History, Reports and Statistics.*

Among the books sent to the Exhibition by the Federal Government of Mexico, there is a set of Reports of the Department of Foreign Affairs, War and Navy, State, Public Works and Interior. These reports describe the labors of those departments, and contain very important facts upon General Administration, Statistics, History, &c.

In the Reports of the Department of Public Works, for instance, we find interesting data concerning Railroads, Drainage of the Valley of Mexico, Harbors, Mints, Exportation of Minerals, Patents, Telegraphs, Geography, Lands, &c.

Under the superintendence of this Department, are Colonization, Appropriations of National Lands. The lands granted from the year 1867 to 1873 cover an area of 69,870,700 acres, and the titles of property conceded in the same period were 512.

The Government sends out surveying parties whose duty is to explore the lands and describe their resources with the view of affording colonizers any kind of information.

In the Report of the Department of the Interior is found the general directory of the mail system of the country. According to it the mails carried by the English steamers arrive at Vera Cruz on the 17th of each month, and depart from the same port on the 2nd. The French steamers arrive on the 14th and leave on the 16th of each month. The American steamers arrive at Vera Cruz every 20 days, and leave two days after. The following figures represent the post-offices in that Republic:

General Office	1
Principal Offices	53
Secondary "	241
Agencies	540
Total	835

Class 306.—*School and Text Books.*

Several teachers in the national and private Schools exhibit in the Mexican Department those text books most generally adopted in the system of teaching now in practice at the capital.

The books on primary instruction comprise the following branches:

Reading. In this section are found from the simplest spellers to the most complicated prose reading books. Mr. Jose Rosa has written different first and second readers.

"La Ciencia Recreativa" is the title of a magazine sent by the Editor, Mr. Joaquin Arriaga, contains very pleasing and instructive reading matter on physics, chemistry, botany and other scientific topics. The Department of Public Instruction, partially supports this publication by buying a large number of copies which are distributed in the public schools.

Arithmetic. The works upon this subject exhibited by Messrs. Jose J. Terrazas and M. Ruiz Davila are adopted as text-books in the national schools. Mr. Terraza's arithmetic, lately published, contains several original methods, doctrines and demonstrations. The work is preceded by several favorable opinions from distinguished Professors of Mathematics, who have examined it, and who admire in the young author's labor, the clearness and conciseness in

the explanations, the variety and originality of arrangement and other important features of the work. Mr. Ruiz Davila's book makes a specialty of the metric system.

Geography. Messrs. Antonio Garcia Cubas, M. Payno, J. Roa Barcena and other Professors, exhibit text-books on Geography.

Mr. Garcia Cubas has published treatises on universal Geography and the special of Mexico. The latter, just issued is as complete as it is well adapted for children's instruction.

Geometry. The books on this subject seen in this section have been written by Messrs. Garcia Cubasand Mucio Gama, and arearranged in the best manner to fulfill the object they are intended for.

Philology. The Grammars of the Spanish language (the language of the country) written by Messrs. Garcia Vargas, Marroqui, and Remigio Rodriguez, occupy a distinguished place in the educational display of Mexico. Mr. Faustin Chimalpopoca, a celebrated writer upon the Aztec language, sent to the Exhibition a treatise of that tongue, still extensively spoken by the Indians in several localities of Mexico.

Mr. Francisco Pimentel's "Treatise on Mexican Philology," is perhaps the most exhaustive work ever published upon the subject. By means of a comparative study, he has been able to classify the aboriginal languages of America into orders, groups, families, individual languages and dialects, of which he mentions the following:

Order (1*st*) *Polysyllabic, Polysynthetic languages of subflexion.*

Families: Mexicana, Sonorense, Comanche Shoshone, Texana, Keres-Zuni, Mutsun, Guaicura, Cochimi-laimon, Seri.

Mexican Opata Group, composed of families independent of each other, Tarasca, Zoque-mixe, Totonaca.

Order (2*d*) *Polysyllabic, Polysynthetic of juxta-position.*

Families: Mixteco-Zapoteco, Matlazinca.

Order (3*d*) *Paulo-syllabic synthetic.*

Families: Maya, Chontal, languages of Nicaragua, Apache.

Order (4*th*) *Cuasi-monosyllabic languages.*

Family, Othomi.

Mr. Pimentel's work consists of 3 volumes, and was published recently under the auspices of the Society of Geography and Statistics.

A volume entitled "Geography of the Languages," was written by Mr. Manuel Orozco y Berra, and published in 1864. It contains three chapters under this heading: "Classification of the indigenous languages of Mexico;" Immigration of the tribes, "and Geography of the languages."

In order to give clearness to this last chapter, the work has a map of the country, showing in colored spots the different localities where the languages mentioned are spoken.

Text-books on Topography, Geology, Astronomy, Mathematics, Agriculture, and other branches embraced in the secondary and professional education, as systematized in Mexico, were sent to the Exhibition by their authors.

Prof. Francisco Diaz Covarrubias' works on Geology, Astronomy, Topography and Calculus, serve as text books in the engineering school of Mexico.

This Author's "New Astronomical methods" were published in 1867, and have been used since in Europe, by distinguished Astronomers. This work is divided into chapters, which comprise the following:

CHAPTER FIRST.

Development of formulæ, their foundations and their application to the determination of time in 4 methods:

By equal heights of two stars.
By unequal heights of two stars.
By equal heights of one star.
By equal heights of the sun.

CHAPTER SECOND.

Determination and design of the astronomical meridian:

By equal heights of two stars.
By equal heights of one star.
By equal heights of the sun.

Determination of the hour and of the Azimuth by means of the transit of stars by any given vertical.

CHAPTER THIRD.

Determination of Latitude.

By equal heights of two stars.

Determination of the hour and latitude by three equal heights.

By the difference of height of two stars.

By the transits of stars through any vertical given

CHAPTER FOURTH.

Determination of Longitude.

By absolute heights of the Moon.

By the observation of the moon and one star at the same height.

By equal heights of the moon.

By the culminations of the moon.

By the observation of instantaneous signs.

By the transport of the Chronometers.

The work contains besides, an appendix which comprises several interesting matters, and some tables to facilitate the study of calculus.

Gen. J. M. Perez Hernandez, exhibits two volumes of his Geographical and Statistical Dictionary of Mexico, in which work the author has compiled all the articles on Geography and Statistics which he had published before, and the studies made lately of several interesting localities in the country.

The Statistical Almanac by Mr. Juan E. Perez, published this year, is a very interesting work. It contains notes on tariffs, import and export duties, and all information concerning commerce. It is of great value, specially for merchants and travellers.

Mr. Rafael Montes de Oca, is the author of a valuable work on the Trochilidæ (humming-birds of Mexico.) In it, an elaborate description accompanied with colored drawings of the following species, is given.

TROCHILIDÆ OF MEXICO.

GENERA.	SPECIES.	GENERA.	SPECIES.
Amazilia.	Ocai.	Calliphox.	Mitchelli.
	Beryllina.	Chlorostilbon.	Caniveti.
	Cerviniventrix.		Auriceps.
	Yucatanensis.		

GENERA.	SPECIES.
Calothorax.	Calliope.
	Cyanopogon.
	Pulchra.
Circe.	Latirostris.
	Doubledayi.
Campylopterus	Delattrie.
	Pampa.
Calypte.	Annæ.
	Coste.
Heliopædica.	Melanotis.
	Xantusi.
Lamprolaima.	Rhami.
Lampornis.	Mango.
Helenæ.	Lophornis.
Myiabeillia.	Tipica.
Ornismyia.	Dupontti.
	Rivoli.
Phæthornis.	Adolphi.
	Cephalus.
Petasophora.	Thalassina.
Cyanomyia.	Cyanocephala.
	Violiceps.
	Quadricolor.
	Viridifrons.
Delattria.	Henrica.
	Clementiæ.
Eupherusæ.	Poliocerca.
Heliomaster.	Pallidiceps.
	Pinicola.
Thœoptila.	Sordida.
	Zonura.
Thaumastura.	Elizœ.
	Enicura.
Thaumatias.	Lerdi (nov. sp.)
	Candidus.
Trochilus.	Colubris.
	Alexandri.
Selasphorus.	Heloisa.
	Rufus.
	Floressi.
	Platycercus.

This work was published under the auspices of the Department of Public Instruction.

Mr. Alfredo Chavero exhibits an essay on the symbolic stone called "Aztec Calendar." This stone worked by the Aztecs, was found while making an excavation in the great square of the City of Mexico, in the year 1710. It measures nine feet in diameter, has a circular form, and is worked in basalt.

The number, the distribution, and the figure of the borders which it contains, led the Archæologist Gama, to consider it as a calendar, according to the description he published of that stone, when it was found. Mr. Chavero, in a new essay, gives also the chronological interpretation of the figures represented in the stone, and states that it is a COSMOGONICAL AND ASTRONOMICAL STUDY OF THE SUN. According to the interpretation of the hieroglyphics, it can be inferred that the stone was worked in the year 1479, during the reign of Axayacatl, father of the King Montezuma II.

This monument of the Aztec civilization is placed at the foot of one of the towers of the famous cathedral, of the City of Mexico, but it will be soon removed to the Archeological Department of the

National Museum. (In one of the lateral entrances to the Mexican Department, is seen a photograph of the monument alluded to.)

Mr. Mariano Barcena, exhibits some essays on the Natural History of Mexico. One of them treats of the mesozoic rocks in the country, and of some of the fossils characteristic of those rocks. Containing besides, descriptions of the species of Hippurites, Nerinæ, Ammonites, Scaphites and Aptycus. His essay on the Cavern of Cacahuamilpa, occupies also a place in this department.

The cavern of Cacahuamilpa, is situated in the middle of a calcareous mountain of the cretaceous period, State of Guerrero. It has in its interior, spacious halls separated by enormous and picturesque stalactites, and stalagmites formed of carbonate of lime. According to Prof. Barcena's account, the explored space in that cave has a longitude of about four miles.

Other works on Literature, History and Geography can be seen in the Mexican section of Education and Science. Among which distinguish themselves, the poetical compositions of Mrs. Esther Tapia de Castellanos.

The newspapers published in the City of Mexico in 1874, amounted to forty-four, of which number twelve were strictly scientific, twenty-five political, four religious and three exclusively devoted to literature.

Class 311.—*Literary, Industrial and Scientific Association .*

There are in the City of Mexico, and in almost all the States literary, scientific and industrial societies, which work assiduously for the advancement of their respective subjects. Those of Natural History, of Geography and Statistics, "Humboldt," "Larrey" and "El Parvenir" are represented in the exhibition by their scientific publications.

The Society of Natural History, exhibits three volumes of its monthly journal entitled, *La Naturaleza*, which consists of descriptions and studies on the Zoölogy, Botany, Mineralogy, Geology and Paleontology of Mexico.

The Mexican Society of Geography and Statistics, is one of the oldest in the country. Its programme is encyclopedical. Besides treating of Geography and Statistics, it also takes up Archæology, Literature, History, Natural and Social Sciences. This So-

ciety is supported by the Department of the Interior. Its paper is entitled *Boletin de la Sociedad de Geografia y Estadistica.* The Society "Humboldt" has also an encyclopedical programme. Its journal being called *Anales de la Sociedad Humboldt,* and contains, more especially studies on Engineering and Medicine. The Mexican Mining Society, although recently established, has worked energetically, and very successfully in aiding the development of the mining and other industries in the country. It publishes a paper under the name of *El Propagador Industrial,* and contains studies upon mining and other similar subjects. "Larrey" Society takes up Medicine and Surgery. Its paper is entitled *Anales de la Sociedad Larrey.*

"El Porvenir," is the name of an association formed by the alumni of the National Schools of Mexico, who devote themselves to literature, sciences and arts. They publish a journal called; *El Estudio.*

The Academy of Medicine, the Pharmaceutical Society of Mexico and other associations, publish their studies regularly in monthly pamphlets. The Mexican Pharmacopœia is one of the most prominent works issued lately by the Pharmaceutical Society.

As a proof that the spirit of association is very well developed in Mexico, stands the fact that in the capital alone, there are seventy different societies, the address of some of which is here given with the purpose of increasing their scientific relations, with foreign kindred institutions.

Name and Address of the Societies.

Society of Natural History.—National Museum, City of Mexico.

Mexican Mining Society.—Calle del Arzobispado, No. 1, City of Mexico.

Society of Engineers and Architects.—Hospital de Terceros, City of Mexico.

Academy of Medicine.—Escuela de Medicina, City of Mexico.

"Pedro Escobed," Medical Society.—Escuela de Medicina, City of Mexico.

Filoiatrica Society.—Escuela de Medicina, City of Mexico.

"Larrey" Medico-Chirurgical Society.—Hospital de San Lucas, City of Mexico.

Society "Humboldt."—Calle de la Alcaiceria, No. 13, City of Mexico.

Pharmaceutical Society.—Escuela de Medicina, City of Mexico.

Commerce Exchange.—Bajos de la Diputacioon, City of Mexico.

"Hidalgo" Lyceum (Literature and Social Sciences) Universidad, City of Mexico.

Society Netzahualcoyotl, (Literature and Arts) Calle del Hospicio de San Nicolas, No. 19, City of Mexico.

Class 312.

This class comprises the museums represented in the exhibition. The National Museum of the City of Mexico, sent the mineralogical collection already mentioned. This museum is situated in an apartment of the National Palace. It has extensive halls, in which there are collections of Zoölogy, Botany, Mineralogy, Geology and Paleontology, technically classified. In the first floor of the establishment, rooms are being arranged to place the archæological and historical monuments of the country already collected. This valuable museum is supported by the Department of Public Instruction.

The mineralogical laboratory of the Mining and Engineering school, contains over 8,000 specimens of minerals, rocks and fossils of Mexico, and several foreign countries. It is represented in the Exhibition by some mineral collections already alluded to.

Class 330.—*Civil Engineering.*

The Department of Public Works, sent two large maps showing the project that the general Government has adopted for the proposed draining of the Valley of Mexico. In the valley there are several lakes occupying large extension of land; some are below the level of the City of Mexico, but others are above, and owing to this last fact, the city is exposed to an inundation. In order to prevent this danger, and at the same time to improve and develop agriculture in the Valley, the Government has proposed to construct channels for the free passage of the waters. As the plan indicates, the main channel begins at the Eastern part of the City and connects with lakes Texcoco, San Cristobal, Xaltocan, and

Zumpango. The waters will then pass through a tunnel, and reach another channel which will take them to the Tequixquiac ravine. The longitude of the first channel will be 48,300 metres and the tunnel's 9,954. The last channel is already open and has a longitude of 2,500 metres, its greatest depth being 28 metres.

The tunnel is already in construction. The soil in which this work is going on is formed of spongy stones, marls and calcareous rocks, belonging to the post-tertiary period. In the excavations made in the Tequixquiac ravine, there have been found numerous remains of mammiferous fossils already mentioned. The design of this proposed drainage is described in detail in the Reports of the Department of Public Works. In those documents we also find the plans, etc., of other works performed on the public roads, by the Government's engineers.

Class 332.—*Railway Engineering.*

In the lateral entrances to the Mexican Department, there are some photographic views of the bridges, viaducts and other works of the railroad from Vera Cruz to the City of Mexico.

This road is one of the most remarkable and daring of its kind, as it passes through extremely broken places. The most broken land is found between Boca del Monte and Maltrata.

This will be seen in the following table, which shows the relative distances to various points of the road and their absolute heights:

Names of Places through which the Road Passes.	Distances In Kilometres. K.	Heights above the Level of the Sea, in Winters. M.
Vera Cruz, (Station)	00.00	1.89
Tejeria	15.41	32.34
La Purga	30.58	44.77
La Soledad	41.97	93.08
El Camaron	63.26	340.76
Paso del Macho	76.04	475.55
Atoyac	85.86	460.77
Cordoba	105.84	827.08
El Fortin	113.79	1,008.59
Metlac, (Bridge)	116.48	978.72
Metlac, (River)	.....	950.56
Orizaba, (Station)	131.82	1,227.63
Maltrata, (Ditto)	152.36	1,691.79
Toma de Agua	165.65	2,157.02

Names of Places through which the Road Passes.	Distances In Kilometres. K.	Heights above the Level of the Sea, in Winters. M.
Boca del Monte, (Station)	172.61	2,415.36
San Andres	203.37	2,430.42
La Rinconada	223.54	2,357.32
San Marcus	241.98	2,373.21
Huamantla	259.23	2,488.06
Acocotla, (Farm)	270.97	2,533.52
Apizaco, (Station)	284.68	2,411.51
Guadalupe	299.98	2,479.43
Soltepec	314.19	2,507.62
Apam	331.01	2,486.92
Yrolo	346.65	2,452.68
Xala, (Farm)	353.99	2,490.38
Ometusco, (Station)	356.25	2,462.68
La Palma, (Station)	362.47	2,407.90
Otumba, (Station)	368.53	2,349.91
Teoltituacan, (Station)	378.71	2,281.57
Tepexpan, (Station)	391.18	2,244.99
Mexico City, (Station)	423.62	2,239.83

Heights, seemingly inaccessible, were all conquered by science, and the rails were placed in huge mountains, bordering deep precipices. In the road between Vera Cruz, and Mexico and in that branching off to Puebla, there are ten viaducts, ninety-three wooden and fifty-five iron bridges. The longest bridges are: the one called "La Soledad," 228 metres, 26 centimetres long; "Metlac," 137 metres in curve and is one of the most imposing. Several of those bridges can be seen in the photographic views already mentioned.

In the track between Chiquihuite and Boca del Monte, there are 15 tunnels, four of which are the most noticeable, and whose lengths are respectively 106 metres, 77 centi-metres; 91 metres, 40 centi-metres; 80 metres, 29 centi-metres; and 60 metres, 96 centimetres. The perforated longitude of the 15 tunnels is 896 metres, 73 centimetres.

The road from Mexico to Vera Cruz, is 423 Kilometres, 750 metres long, and the branch from Apizaco to Puebla 27 kilometres long.

Besides the beautiful landscapes presented to the traveler by deep ravines, the elevated mountain tops, and the splendid vegetation found all along the road, there are other objects which increase the attractiveness of the picturesque views. On leaving the

City of Mexico, the beautiful lakes of the Valley, and the elegant tops of the Popocatepetl, and the Yxtatlcihuatl, ever crowned with whitest snow, are presented to the eye of the observer. In San Juan Teotihuacan again, are seen the pyramids raised by the "Toltecs," and dedicated to the Sun and the Moon.

Farther on are seen the extensive *maguey* fields, that precious AGAVE, of which intoxicating liquors and the famous "pulque" are extracted. On arriving at Apizaco and Boca del Monte, we behold the lofty mountains "Malinche" and "Pico de Orizaba" with their shining, snowy tops. The "Orizaba" has an elegant form, and its summit by appearing to the Aztecs like a star, induced them to call it Citlaltepetl ("mountain star)."

On descending to the "tierra caliente" or hot land the traveller comes upon the rich plantations of coffee, orange trees, banana and tobacco plants.

The railroad from the City of Mexico to Vera Cruz was inaugurated on the 1st of January, 1873, by the President of the Republic. Besides this there are other railways in Mexico, ready for traffic. The company which proposes to build the road from the capital to Leon, has begun its preliminary works.

In the report of the Department of Public Works, of 1874, the following data are found.

Longitudes of the roads travelled by steam engines:

From Mexico to Vera Cruz	423,750	Kilometres.
From Apizaco to Puebla	27,000	"
From Mexico to Tlalpan	24,875	"
From Zamorana to Medellin	17,000	"
	492,625	"

Longitude of the roads travelled by horse power:

From Mexico to Tacubaya and to Popotla	13,913	Kilometres.
" " " Atzcapozalco	10,000	"
" Vera Cruz to Jalapa	40,000	"
	63,913	"

The total longitude of railroads ready for traffic up to that year was 556 kilometres and 538 metres.

Some of these roads will be extended, and the works have been advancing, especially in that from the City of Mexico to Toluca.

Class 325.—*Maps.*

The map of the District of Mexico on exhibition, belongs to the Department of Public Works. It was made under the auspices of that department, by a commission of engineers appointed to form the geographical, hydrographical and geological charts of the Valley of Mexico. This map is one of the first works of that Commission, who, headed by the geographer Don Francisco Diaz Covarrubias, performed their works by means of very exact geodesical and astronomical operations.

To the same department belong the map of the City of Mexico and others concerning the geodesical works made in that Valley.

The general chart of the Republic by Mr. Antonio Garcia Cubas contains many details on the hydrography, etc., of Mexico, and some notes relating to telegraphs, railroads, steamers and other important subjects. On one side of the map is seen a comparison of the principal heights of the Republic, among which are the following.

Mountains.	*Heights above the sea.*
Popocatepetl	5400 Metres.
Yxtacihuatl	4786 "
Citlaltepettl in Orizaba	5295 "
Nevado de Toluca	4623 "
Ajusco	4153 "
Cofre de Perote	4081 "
Nevado de Colima	3668 "

A comparison among the principal rivers of the country, shows their relative length, as follows:

Rivers.	*Leagues.*
Santiago runs over	208
Mescala " "	164
Yaqui " "	150
Usumasinta " "	131
San Pedro " "	115
Panuco " "	110
Ures " "	101

	Leagues.
Sinaloa runs over	100
Alvarado " "	87
Fuerte " "	84
Altar " "	83
Nazas " "	81
Mayo " "	74
Coatzacoalcos "	67
Culiacan " "	60

The steamers which periodically touch at the harbors and whose directions are marked in the map, are the following :

The steamers belonging to the Alexander & Son's line, leave Vera Cruz every 20 days and go directly, one to New York, and the other to New Orleans. The first touches Campeche, Progreso, Havana (Cuba) and New York; the other touches at Tuxpan, Tampico and New Orleans.

The Liverpool line leaves this harbor on the 10th of each month and touches at Kingston, Vera Cruz and Tampico.

The English steamer leaves Southampton on the 2nd of each month and touches at St. Thomas, Havana, Vera Cruz and Tampico.

The Transatlantic-line steamers leave Saint Nazaire on the 16th of each month and touch at Santander, San Thomas, Martinica, Havana and Vera Cruz.

Mr. Garcia Cubas exhibits, also, an atlas of the Mexican Republic, in which all the different states are minutely described. The atlas ends with two hieroglyphical maps, which explain the pilgrimages of the Aztecs, since their emigration from Astlan, till their detention in the Valley of Mexico. In another map is seen the interpretation of the principal hieroglyphics found in the Aztec monuments. The first of these maps was copied from the original, which is now kept in the National Museum, and which was painted by the Aztecs on maguey paper, more than four hundred years ago.

Mr. Mariano Barcena exhibits the botanical, mineralogical and geological maps of four of the districts of the State of Queretaro. In the botanical, are marked the zones occupied by the more characteristic plants of that State, as follows:

FAMILIES.	GENERA.	SPECIES.
Cupuliperæ	Quercus	(several).
Ericaceæ	Arctostaphilos	Pungens.
Coniferæ	Cupressus	(several).
Malpighiaceæ	Galphimia	Hirsutæ.
Cactæ	Melocactus	
Leguminosæ	Ynga	Circinalis.
Escrofulalariacæ	Manulea	
Sapindacæ	Dodonæ	Viscosa.
Polemoniaceæ	Læselia	Coccinea.
Anonacæ	Anona	Yndica.
Rhamnæ	Rhamnus	Humboldtiana.

In the mineralogical map are marked the different localities where the following minerals are found: Tetraedrite, Cinnabar, precious and common Opal, Gold, Galenite, Cerusite, Psilomelan and Lignite

The geological map of the same State contains cretaceous, tertiary and post-tertiary formations.

The three maps on exhibition have been published together with a report which Mr. Barcena wrote on his return from an expedition to the mountain-range of Queretaro, made by the request of the Minister of Public Instruction, with the purpose of taking students of the Engineering School to make practical studies on Geology. Mr. Barcena also drew the geological maps of one part of the States of Aguascalientes and Hidalgo, and of the volcano Ceboruco, already mentioned in the geological part of this catalogue.

In the map of the Ceboruco, are noted down the periods of the eruptions observed in that volcano.

There are, besides the Æthnographical chart of Mr. Epstein, to which reference has been made, a large encyclopedical map formed by Mr. Ildefonso Estrada y Zenea, which shows the development of literature, science and arts. This map may be of great usefulness in the system of objective teaching.

FINE ARTS.

Classes 400, 410, 413, 421 *and* 430.

The largest number of the Mexican paintings, brought to the exhibition were sent by the Academy of San Carlos, established in the City of Mexico, by Carlos III., of Spain. This Academy is one of the most celebrated institutions in the country, not only for the merit of its collections of paintings, sculpture, and engravings, but for the liberal, inexpensive and highly systematic education it imparts.

The progress attained by this school of arts, since its establishment has been always in proportion with the assiduous efforts of the government to support it, and with those of the professors under whose directorship it has grown.

In the year 1791, Don Mariano Tolsa, having been appointed director of the sculpture department, brought from Spain, a large collection of sculptures modeled in plaster, being a present made by the King Carlos IV., to the Academy.

The illustrious Humboldt, visited this institution at the beginning of the present century, and expressed the opinion, that the collections of the Academy of San Carlos, were not equaled by any in Germany.

Since the establishment of the Republican Government in Mexico, this academy has been under the protection of the Federal administration, and it is to be observed that its improvements in all lines have never been checked or paralyzed by any event, or circumstance as this, which has made of this school, perhaps the best in the country, being worthy of mentioning, the statement of travellers, that the Galleries of paintings in this Academy are richer than any of the richest in America. The sculpture and engraving galleries, are also of great importance.

The following branches constitute the plan of study in the Academy. Painting, Sculpture, Landscape, Modeled Decoration, all kinds of engraving, Natural Drawing, Copying from Statues, Sketching from Nature, Perspective, Architectural composition,

Classic Orders, and copying from monuments, Arts of constructing, Legal Architecture, Æsthetics and history of the Fine Arts, and the Anatomy of Form.

The institution is under the care of a director, and has eighteen professors and some assistants. Every two years an exhibition is held of the works executed in the Academy, and of those displayed by other Mexican and foreign artists. The number of pupils in the Academy in 1874, was 453.

Room No. 9, and part of room 29 in the annex to Memorial Hall, are occupied by Mexican paintings, and also room 6 in the last mentioned building, contains pictures sent by the Academy spoken of. These paintings show the history of the progress of fine arts in Mexico, from the XVI. century to the present time.

Among these paintings, forty-seven were sent by the San Carlos Academy, as well as the seven sculptures in room 9; 14 by several other artists. Of the latter, seven were painted by Miss Guadalupe Carpio de Mayora, and one, entitled "The Aztec Embassy," by Mr. Pablo Valdez, professor of painting in the Lyceum of the State of Jalisco.

Mention ought to be made in this connection of the photographic pictures exhibited in Photographic Hall, by Mr. Cruces y Campa, of the city of Mexico, and of some enameled portraits by Mr. Zayas.

Photographic art in Mexico is remarkably advanced, and among the most industrious and skilful photographers of the country, deserve mention Messrs. Cruces y Campa, Figueroa, and Valleto, in the city of Mexico, Mr. O de la Mora, in Guadalajara, and Pedro Gonzalez, in San Luis Potosi.

In the section devoted to ladies' work in the Mexican Department of Main Building, there are some photographic portraits executed by Miss Vicenta Salazar, from the city of Mexico.

Sebastian Navalon, professor of engraving in the San Carlos Academy, makes a very interesting display of medals, mint stamps and other engraving works, some of them executed by himself and others by his pupils.

AGRICULTURE.

Agricu lture in Mexico, as well as in almost any other Country, outranks by its usefulness, extent and purpose, all the other branches of the national production. The proverbial mineral wealth of the Republic has had a rather detrimental effect upon the imagination, and has contributed to give to the activity of enterprising organizations, and to the natural and foreign capital, a certain tendency towards the mining pursuits. Experience, however, warrants the assumption that the future prosperity of the Mexican people depends to a large extent upon the development of its agricultural resources. Our exhibition has been exceedingly incomplete under this point of view: the causes we have referred to in the first pages of this volume, have worked in a peculiar manner upon the mind of our agriculturists and kept them away from the noble competition, which has attracted to Philadelphia the representatives of almost all the cultured countries. With nearly the only exception of our fibres, our coffee, and some other few articles which can be considered as a subject of progressive export, the products of Mexican agriculture have been confined till now to the domestic markets, and a great many articles which grow profusely in Mexico, and which could be sold profitably abroad, have been kept within the limits of the natural consumption. The Mexican farmers, therefore, although they were invited, to contribute to this exhibition, have not felt themselves prompted by the individual interest of those producers and manufacturers who have taken advantage of the opportunity to exhibit and advertise their products in this international display. Country people are everywhere the most tenacious in their habits, and the Mexican agriculturists at large have not yet reached the point of feeling the industrial and commercial solidarity of nations, and of considering their future prosperity as connected with the intercourse of other countries, and their reciprocal interchange of production.

This fact must be deplored, inasmuch as the fertility of our soil and the peculiar variety of our crops, make the agricultural produc-

tion in Mexico by far larger than the domestic wants of the people. It is on account of this disproportion, which increases every day, and which a few years ago brought the Mexican agriculturists to the very verge of universal ruin, that some of them begin to turn their eyes to the foreign markets, and to introduce some new cultures, adapted to the necessities of the consumers abroad.

As far as soil and climate are concerned our lands can produce every variety of those articles which furnish food, shelter, and comfort to the human race. The combination between the geographical and the topographical circumstances of the country explains the varied atmospheric conditions which place within the capacity of some of our agricultural districts the production of nearly every imaginable growth.

Between the high summits of the Mexican volcanoes which tower at about 18,000 feet above the level of the sea, down to both shores on the Pacific and the Gulf, there are a great many intermediary degrees proper for the most varied types of vegetation.

The "guayabas" (Psidium), the ANONACEÆ, the ACACIÆ, and other plants, live and grow abundantly in the low grounds where coffee and sugar cane can be cultivated under the most favorable condition; the Leguminosæ, the Ericaceæ, etc., occupy the medium heights, and the coniferous and Cupuliferous plants climb up to the limits of perpetual snow.

Several botanic families seem to be adapted to all climates, and their genera are found at different levels, living at home even in dry and rocky grounds. Among these may be mentioned the BROMELIACEÆ, and Amarilidœ which occupy the greater part of the Mexican mountains. The famous *agave* is found in profusion, bestowing everywhere its precious fibres and its healthy and exhilarating sap.

The arable lands of Mexico exhibit all kinds of compositions, a circumstance which together with the favorable climate which prevails all over the country, give to the husbandman reliable guarantees of success. The low grounds in the valleys and in the glens and even those upon the hills, are formed of fragments of the neighboring mountains, which by the nature of their rocks afford rich elements of fertility. A great part of the mountains of Mexico are formed of trachytic pophyries, and others of calcareous banks and

clayey slates. The atmospheric agents attack these porphyries very easily, and the clays, therefrom, carry down to the lower lands the soluble silica and the alkaline carbonates which come from the action of carbonic acid upon feldspar. That atmospheric work, protracted for many centuries, has produced great quantities of fertilizing materials. The rains by the influence upon the calcareous and the clayey rocks have washed down the fragments to the low soils.

The Mexican valleys are formed, in great part, of spongy stones, marls and sand, of the post-tertiary period, which combined with clays and some other of the above-mentioned materials, produce very favorable mixtures for the development of plants. The despoliations of the woods, complete fertilizing elements of the land.

This natural process occurs in nearly all the valleys of Mexico, since the mountains, woods, etc., are spread in the most favorable directions for the formation of cultivable soils.

ARBORICULTURE AND FOREST PRODUCTS.

Class 600–601.

The beneficial influences already described affect likewise the wild plants growing in the Mexican territory. Woods of secular trees cover the coasts and mountains and afford proper materials for ordinary constructions and works of art. As types of those immense trees, may be mentioned the "Santa Maria del Tule Tree" in the State of Oaxaca, and the *sabinus* from Chapultepec. The former belongs to the coniferous and to the species *Taxodium Disticha.* It has 36 meters of circumference near the ground, and its foliage is thick and fresh notwithstanding the age of the tree.

The latter (also Taxodium Disticha), are very remarkable for their height and for the thickness of their trunks. They were already in existence about four centuries ago, during the reign of Emperor Montezuma II.

The collections of woods exhibited in the Mexican Department, comprise both common and ornamental materials.

Among the most endurable woods, there are some note-worthy: the one for instance, known under the name of "Tepehuage" (Acacia Acapulcensis), which is generally preferred in the con-

structions intended to support great weights, and the "Mezquite" (Ynga circinales) usually applied to the same purpose. The most useful woods are found among the numerous species of the *Acaciæ* and other genera.

As for fine and ornamental woods, there are several and varied species in the collections from the States of Vera Cruz, Colima, Tamaulipas, Puebla, Morelos, and Mexico. The mahogany tree, the odorous cedar, and, others of a light color, are usually employed in cabinet-work, with black wood like the ebony and KALKACHE, or with some dark and fancy graining, in which the Mexican exhibit abounds.

Particular mention must be made of the LINALOE, the "Palo Escrito," and the "Palo de Campeche." The linaloe (amyris lignaloes) has a clear yellow tint enhanced with graining and is susceptible of a beautiful polish. The peculiarity of that wood consists in its delicate and very pleasant fragrancy; this quality makes it very highly esteemed for toilet boxes, and fancy articles. The linaloe grows profusely in the States bordering the Pacific, and especially in Guerrero, Colima, Michoacan and Jalisco. The principal specimen in the Mexican section, comes from the last-mentioned State.

The "Palo Escrito" belongs to the Leguminosæ family. It has the color and fineness of the mahogany, but is besides ornamented with black grainings, and this accounts for the name, "madera escrita" (written wood).

This interesting wood grows abundantly in the State of Hidalgo, whence it can be easily carried to the port of Tampico.

The Campeche tree (Hematoxilum Campechianum) is known all over the world from very remote times, for its dyeing properties. It is shipped off in the Gulf of Mexico, and more especially in Campeche.

Large quantities of precious and ordinary woods are exported from Mexico to Germany, France, United States, Spain and England. In the year 1873, the value of the exportation was the following:

Mahogany and Cedar woods	$406,300.99
Mulberry-Tree wood	46,783.12
Building woods	175,712.70
wood	25,181.50
Tint wood	388,608.00
Total	$1042,586.31

Class 603.—*Gums, Resins, Vegetable Wax, &c.*

The Mexican Society of Natural History has exhibited some indigenous gums and resins, which are largely used in medicine and in the arts. The resin known as "Coapinole" (Hymenea Courbaril), is consumed by the manufacturers of varnishes, and is remarkable for its transparency and clear color, rather similar to that of amber. Large quantities of this material are collected in the State of Oaxaca, and is sold in the City of Mexico at one dollar a pound. Its properties are identical to those of the India Copal. Under the general name of Copal, are known in Mexico several resins produced, by plants of the Elaphrium genus, and which can be used as aromatic, or for the manufacture of varnish, their colors being bright, and their prices are extremely low. The resin called "Penca Copal," is produced by the Elaphrium Copalliferum. It is exceedingly abundant, and its price 20 cents a pound.

The same collection of the Society of Natural History includes the following resins:

Lechon.—Produced by one Hypomanea. It is caustic, and destroys the hair. It can be the substitute of TAPSIA; 500 grammes of that resin, worth 50 cents, have a 5 per cent. of active principle.

Xochicopal.—Aromatic resin produced by Amyris lignaloes. It is used as a fumigating perfume and for the preparation of aromatic extracts. In the City of Mexico it is worth 24 cents a pound.

Estoraque.—Name given by the Indians of the southern portion of Mexico, to a bark impregnated with resin from the linaloe. They burn it to perfume their dwellings. Price in the State of Morelos, 5 cents a pound.

Cuajiote.—Gum-resin from the Rhus perniciosa, used to cure the scorpion bite, and for the preparation of a cement to mend porcelain and glass.

Archepin.—Gum used for the same purposes.

Incense.—Several resins are known by this name, and are used as fumigatory perfumes. The principal come from the ICICA INCIENSO, and from the ROSMELIA FLORIBUNDA.

Brea.—A very useful resin, the result of the distillation of the turpentine, from the PINUS TEOCOTE which grows in the cold districts of Mexico. Brea dissolved in warm alcohol precipitates after cooling, becomes pure and takes a white color. It is used for the preparation of illuminating gas, and in the manufacture of soap. The price of a pound is two cents.

Dragon-tree Blood.—Astringent resin produced by the Pterocarpus

Drago. In the State of Guerrero, is considered as a medicine against diarrhœa.

Tucamaca.—Resin from the ELAPHRIUM TOMENTOSO. Price one dollar a pound.

Mangle.—Resin from the Rhisophora mangle.

Tescalama.—Resin from the Ficus Nymphæfolia, used in the fabrication of varnishes. Its price is thirty-two cents a pound.

Carana.—Medicinal resin, produced from the Amyris Caranna.

Chicle.—Resinous product from the Achras Sapota. It is used for chewing to increase the flow of saliva.

Durango Caoutchouc.—New elastic gum, brought to the Society of Natural History by their member, Mr. Bartolome Ballesteros, and studied by Mr. Fernando Altimarano, of Mexico. This gum is the product of a herbaceous plant, belonging to the Synancheræ family which vegetates in the State of Durango. Like the genuine caoutchouc, it hardens with sulphur, and receives a beautiful polish. This article when known, will be applied to a great many uses.

The India-rubber tree from which the caoutchouc is extracted, grows abundantly in Chiapas, Campeche, and other localities near the Gulf of Mexico. The species to which the name of "India-rubber tree" is generally given, is the CASTILLOA ELASTICÆ of the ARTOCARPÆ family, described by the botanist, Vicente Cervantes. This plant produces abundantly, a milky juice, which on drying is transformed into caoutchouc. The CASTILLOA ELASTICA, is a tree which grows to the height of from fifteen to twenty metres. It can be largely propagated along the low, wet shores of the Gulf of Mexico. There are in the country more than ten species of the FICUS genus, and some other plants which produce caoutchouc. The export of India-rubber in 1873, amounted to $93,052.88 cents.

VEGETABLE WAX.

The specimens of vegetable wax, exhibited by the Society of Natural History, are the products of the MYRICA JALAPENSIS, a small shrub found in the Eastern States of Mexico. The exhibit contains the seeds which produce the wax, the product in different states of purity, and some perfectly white candles made of this material. This wax is sold at very low prices in the States of Hidalgo, Puebla and Vera Cruz.

Class 620. *Cereals, Grasses, &c.*

The erroneous idea prevailing among our farmers, that this International Exhibition was chiefly intended for specimens and products, beyond the ordinary standard, has made the Mexican display very

poor in some of the leading articles of our Agriculture. Such is the case with regard to wheat, rice, indian-corn, beans and all the above-mentioned products which are grown under the most favorable circumstances in Mexico, and there are a great many districts where it can be said that nature saves to the agriculturist, to a certain extent, the labor of cultivation. This, which could be considered an exaggerated assumption, is realized along the coast, and in the hot land of the interior, with regard to indian-corn, which grows nearly spontaneously. The development and prosperity of this interesting and fundamental branch of industry will increase in the same proportion, that the labor-saving processes and the good methods of culture, will be adopted by the Mexican farmers. This is all that they want to maintain the competition in the foreign markets. The improvement under this point of view, is already perceptible, and there is every prospect that those among the Mexican agriculturists, who grow wheat, barley, rice and kindred articles, will have in a near future, a large share in the profits which exportation abroad affords to the farmers of other nations.

The collection of wheats exhibited by Messrs. Cuevas Bros., the samples sent from the large farm of Coahuistla, and the specimens of corn, and rice in the Mexican section, can give an idea of what this kind of products are in Mexico.

Class 623. *Tobacco, Coffee, etc.*

Tobacco is one of the most important agricultural products in Mexico. By its aroma, and other peculiarities, it can compete with the famous Havana. Tobacco is raised in several states, as for instance, Vera Cruz, Chiapas, Puebla, Jalisco, Colima, Yucatan.

The samples on exhibition are of a superior quality, especially those from Vera Cruz. The connoisseurs praise equally the raw material, and the manufactured. The exhibitors from Vera Cruz, keep their establishments in that part, likewise those exhibitors from the City of Mexico, Puebla and other places. The tobacco trade is daily increasing in Mexico. Besides its consumption in the country, it is exported to the United States and Europe. The exportation in 1873, was $132,984.75.

The following are the exhibitors of tobacco in the Mexican Department:

Name.	*Exhibits.*	*Address.*
Madrazo & Co.....	Cigars and Cigarettes.....	City of Vera Cruz
Balza Bros.....	" " "	" " "

Name.	*Exhibits.*	*Address*
Anastacio Ortiz.....	Cigars and Tobacco.....	City of Mexico.
Tomas S. Gardida...	Cigars, Cigarettes and Tobacco	" " "
Lascurain & Co.....	" " " "	" " "
Antonio Canizo.....	Cigarettes.....	" " "
Canedo & Co.....	Cigars.....	Tuxtla.
M. de la Torre.....	Cigars and Tobacco.....	Teziutlan, Puebla.

COFFEE.

This interesting branch of the Mexican agriculture is acquiring a rapid development and give already profitable occupation to a great many foreign emigrants. The present Minister of the U. S. in Mexico, wrote lately a report about the Mexican coffee which deserves, we think, the honor of being here reproduced.

CULTIVATION OF COFFEE IN MEXICO.

By Hon. John W. Foster, *United States Minister to Mexico.*

The total product of the coffee-crop of the world for 1874 is estimated at about 900,000,000 pounds,* of which amount the United States imported in 1875 one-third, or 317,970,665 pounds; which fact is sufficient to indicate the great interest which this country has in its production and cost.

The chief coffee-producing countries are Brazil, (whose product is about two-thirds of the entire amount,) the Dutch colonies, the West Indies, the Central and South American republics, and Ceylon.

Coffee was first introduced into Europe more than two hundred years ago, but during the last fifty its use has greatly increased, and of recent years the supply has not kept pace with the growing demand in the civilized world. In the United States the amount imported twenty years ago, in 1856, was 235,865,268 pounds, of the value of $21,573,558. In 1875 the amount imported was 317,970,665 pounds, of the value of $50,591,488. But as the consumption was affected somewhat from year to year by the production, it is fair to estimate the average importation. The three years beginning with 1856 show an average annual importation of 221,800,000 pounds, of the value of $20,700,000; and the three years ending with 1875 an average annual importation of 298,-

*American Grocer, September 26, 1875.

700,000 pounds, of the value of $50,800,000. It will thus be seen that in the past twenty years the increase in quantity of imports of coffee has been only 34 per cent., which is 12 per cent. less than the increase of population, but that the increase in value has been 146 per cent.

It will be interesting to make a comparison with the importations of the other table beverage, tea. The increased amount of importations in pounds (annual average) of tea from 1856 to 1875, inclusive, has been 136 per cent., or 81 per cent. more than the increase of population, the latter being in the past twenty years 55 per cent. The import consumption of coffee and tea *per inhabitant*, estimating the population in 1856 at 27,000,000 and in 1875 at 42,000,000, was as follows :

	1856. Pounds.	1875. Pounds.	Per cent.
Coffee	8.21	7.11	Decrease of 13
Tea	.93	1.43	Increase of 54

Comparing the consumption of coffee and tea with the population, it is thus seen that the increased consumption of coffee has fallen behind the increase of population, while that of tea has very largely exceeded the growth of the country, and that there is actually less coffee used *per capita* than twenty years ago. The reason of this is not found in the decreased popularity of coffee as a beverage, as it holds a place in the taste of the American people much above tea; but the explanation is justly to be attributed to the growing demand for coffee throughout the world, and the failure of the production to keep pace with that demand, which has greatly enhanced the price. The price in gold of tea at wholesale is to-day as low as it was in 1860, before the civil war,* while coffee is nearly double the price of 1856–'60.

These statistics are given to show that the United States are deeply interested in the increased production of coffee, and in finding new and more accessible sources for its supply of this article, of which it is a much larger consumer than any other nation in the world.

It may be an unknown fact to many Americans that at our very

* New York Post, March 29, 1876.

doors, in Mexico, our neighboring republic, there exists the agricultural capacity to produce all the coffee that can be consumed in the United States, and of a quality equal to the best grown in any country. Mexico, it is true, is exporting very little coffee, and scarcely figures in the coffee-producing countries, but its capacity and adaptability for its production have been tested by more than fifty years of successful cultivation.

The topographical and climatic character of the country is admirably adapted for this purpose. The great Andean mountain range coming up through South and Central America, greatly depressed in the Isthmus of Tehuantepec, apparently for the passage of the commerce of the two oceans, suddenly springs up in Southeastern Mexico into lofty cordilleras, one branch of which follows close along the Pacific and the other along the Gulf coast of the country, holding up on these two arms the great table-land of the interior, thus affording every variety of production of the earth. The coffee-producing regions are found on the entire line of the sea-slope of the mountains from Guatemala on the south, on the Pacific side, for more than a thousand miles to the north, until it reaches a line in the State of Sinaloa where occasional frosts endanger the crop; and also for more than a thousand miles on the Gulf coast from Yucatan into Tamaulipas. In addition to these immense stretches of country it flourishes in the numerous and fertile valleys of the interior, wherever the great table land is sufficiently depressed to reach the level of tropical and semi-tropical vegetation.

The elevation above the sea at which it is thought coffee is most favorably grown is from 1,000 to 4,000 feet; but in Mexico it is cultivated with success at an elevation of 4,500 feet, and it is found even still higher. So also it is grown at lower levels than 1,000 feet, as in various places in Mexico it is produced at the very sea-side. Off the eastern coast of Yucatan, on the island of Cozumel, coffee trees of prolific yield are growing nearly at the sea-level as well as in many other localities on both the Pacific and Gulf coasts. So that it will be seen that the area for the cultivation of coffee in Mexico is immense. The amount of its production, so far as natural capacity is concerned, need only be limited by the extent of land brought under cultivation.

As already stated, the adaptability of Mexico as a coffee-pro-

ducing country has been tested by more than fifty years of experience in its cultivation, which experience proves that in profit to the producer, as well as in quality of the article, this country has no superior. That it has not assumed the first place in exportation is to be attributed to other causes than the capacity of the soil, profit of the cultivation, or the quality of the article—to the same causes which have retarded all commercial and agricultural development of the country. In 1818 and 1819 the profitableness of the growth of coffee in the West Indies led to the establishment of extensive plantations in the vicinity of Cordova and Orizaba, and in 1825 they were in a flourishing state. In the valleys of Cuernavaca and Cuautla, in the interior, in 1826 there were estates where there were growing as many as five hundred thousand plants.* And elsewhere in the republic much attention was given to coffee planting at that period, and great hopes were entertained that the country would soon be largely engaged in its exportation to foreign countries. But the civil disorders, which began soon after and which continued till lately, paralyzed all business enterprises, and disappointed these hopes; so that the coffee production of Mexico has been mostly limited to supplying the home demand, which is quite large, as coffee is in very general use by all classes.

During the past few years, up to the close of 1875, there have been peace and security in the country, and the cultivation of coffee has begun to increase, so that a small exportation has commenced. The statistics of the single port of Vera Cruz will show the growth of this exportation, which, although insignificant as compared with the total production of the world, still indicates a very healthy development of this industry; it ought in a few years to become very considerable:

Exportation of coffee from Vera Cruz, 1871 *to* 1875.

	Pounds.
Year ending June 30, 1871	672,588
Year ending June 30, 1872	1,912,020
Year ending June 30, 1873	3,909,446
Year ending June 30, 1874	4,204,446
Year ending June 30, 1875	5,373.678

* See Ward's Mexico, Book I.

The coffee exported from Vera Cruz is all grown in that State, with the valley of Cordova, on the Mexico and Vera Cruz Railway, as the chief centre of its production. A brief reference to the methods of its cultivation at Cordova may be a matter of interest to the vast number of coffee drinkers in the United States, many of whom know nothing of the article except at the daily breakfast table.*

The seed or grain, which should be selected with care, is usually planted in well-prepared beds in a nursery, shaded from the sun. The young plants are transplanted at the age of one year or eighteen months to the fields or *cafetales*, which are thoroughly cleaned of all undergrowth and the soil well prepared. As the young plants are very tender, it is necessary to protect them from the sun. For this reason open forests are used, where available, and the mountain sides affording shade are utilized for coffee plantations. In open fields a growing shade must be created, which is most quickly obtained by planting banana trees, also yielding some profit from their fruit. But the best cultivators at Cordova consider this a poor substitute. One of the most intelligent planters there has set out in his coffee fields a large number of chinchona trees, (from which quinine is obtained,) which grow well in that latitude; also valuable timber trees, as the oak, walnut, &c. The second year after planting there is a very slight yield of coffee; the third year about a half crop; and the fourth year (or when the plant is five years old) a full crop is gathered.

A reasonably rich soil is desirable for coffee, and manuring pays well in the vigor of the tree and increase of yield. The distance at which plants are set out in the field is usually about three yards (or *varas*) apart each way, although often planted closer. The cultivation consists in keeping the fields clean from weeds and undergrowth and plowing the soil; in certain localities irrigation is necessary, but in Cordova, after the plants are well started in the field, this is not required; and the better class of planters give careful attention to pruning, keeping the plant or tree at the height

* Hon. Matias Romero, well known in the United States as the former Mexican minister at Washington, has recently written a valuable work, in Spanish, on coffee cultivation, entitled, "*Cultivo del cafe en la Coosta Meridional de Chiapas.*"

of from 6 to 8 feet, although if unchecked it will grow to double that height.

The trees do not yield their full blossoming at one time. The first flowering is sometimes as early as December, the second about February, and the third and most abundant the last of March and the month of April. Early in April last it was my good fortune to spend several days in Cordova, in the midst of the blossoming season. The suburbs of the city in all directions are devoted to coffee cultivation. The lanes, lined on each side with *cafetales*, presented a most agreeable sight—the pure white blossoms, clinging close along the branches half covered with the bright green leaves, gave the trees the appearance of being sprinkled with snow; and the perfume of the flowers, almost equal to that of orange blossoms, loaded the air with its fragrance.

The flower falls, leaving a round green berry, which ripens in seven or eight months, changing when ripe into a red color. Each fully-formed berry contains two grains; though sometimes it contains only one grain, which is rounded or oval-shaped, called by the Mexicans *caracolillo*. On account of the different times of flowering, the picking or gathering season lasts for three or four months, each tree having to be carefully gone over three or four times by hand. This is the most tedious and difficult process of the whole cultivation; it cannot be postponed, must be done carefully, and requires an extra number of laborers; but women and children can be employed at low wages.

The first process after picking is to dry the berries, which is done by exposing them to the sun, when they shrivel and change to a black color. They are then put into a mortar, and the grains hulled or beaten out with a pestle. The grain is then separated from the chaff by the crude process of fanning it out by hand or winnowing, though sometimes a fan-mill is used. The coffee is afterwards picked over carefully, grain by grain, by hand, and selected; and it is then ready for sacking and the market. Up to the present the "doctoring" process of artificial coloring or bleaching, as in some countries, has not been resorted to here. The process of curing, after gathering the crop, is in a most primitive state in Mexico. It presents a fertile field for Yankee ingenuity to invent instruments and methods to facilitate the process, or for en-

terprise to avail of the inventions in use in other countries. And although it has been grown here for so many years, the coffee cultivation in Mexico may yet be considered in its infancy, as it is only beginning to receive the attention of intelligent and scientific cultivators. So that great improvements may be anticipated both in the cultivation and curing.

Experience has, however, proved that it is a *certain* and *reliable* crop. So far, its cultivation at Cordova has developed no disease of plant or berry. Insects do not attack it. It is very little affected by the climate, as in the locality of its production there is no frost; and although great drought may diminish the crop, it does not destroy it. The flower when in full bloom is sometimes broken off by severe winds, but this seldom diminishes the yield. The crop is also clean and comparatively easy to cultivate. After the *cafetal* is once in full bloom, the cultivation is easy. Only at the picking season is there much urgency required. Once gathered, the crop can be cured and prepared for market leisurely and at the planter's convenience.

The most prominent objection is that so much time is lost before a profit begins to be realized. If a planter commences with sowing the seed, he must wait more than five years before he obtains returns upon his investment; or four years if he plants from the nursery, as the first year's crop barely pays more than the cost of cultivation and curing. But as compensation for this, a plantation once established yields a never-failing crop, without renewal, anxiety, or uncertainty, for a life-time. And the profit in Mexico during the past few years has been about 100 per cent. over the cost of cultivation, and 10 per cent. interest on the capital invested. The period the trees will continue bearing is variously estimated, but the usual estimate is from twenty to twenty-five years. There are, however, trees now growing in Cordova sixty or seventy years old, remains of neglected and abandoned plantations, which by pruning and cultivation are yielding a fine crop. An intelligent American planter in that valley claims that with attention and care plants ought to continue bearing vigorously for fifty years. Another important feature of coffee-planting in Mexico is that the locality of its cultivation is usually both healthy and attractive, elevated above the fatal diseases of the tropics and in the presence

of the most beautiful scenery. The valley of Cordova, for instance, is among the foot-hills of the great mountain of Orizaba, whose peak is covered with eternal snow, in a rich semi-tropical vegetation, and with a remarkably equable climate, the elevation being 3,000 feet above the sea.

The average yield per tree at Cordova is estimated at about one and a half pounds, although it is claimed that with intelligent culture, pruning and manuring, the average yield in the valley may be increased to three pounds per tree. It is not uncommon to find trees yielding from five to seven pounds, and in very exceptional cases, from twenty-five to fifty pounds each. With the trees, planted three yards apart each way, with the above stated average, it is easy to estimate the yield per acre. It is unsafe to give a detailed calculation of the outlay required in establishing a plantation or *cafetal* up to the time of yielding the first paying crop, as much depends both upon the locality and the intelligence and economy of the planter, so that published estimates are apt to mislead. It may be stated, however, that after the plants begin to bear a full crop, the cost of annual cultivation, up to sale in local market, is from six to seven cents a pound.

It is very difficult to give any definite idea of the price of land in the coffee growing regions. The average price, as per sales which have been made in the valley of Cordova, beyond the vicinity of the city during the past two years, has been about $10 per acre; and, at points out of the reach of the railroad in the same State of Vera Cruz, sales have been made at $5 per acre, or even less. But this has been in a time of great business depression; and, with a revival of commerce and a growing demand for coffee lands, the price would very soon advance, possibly 50 or 100 per cent.

In what has preceded I have referred particularly to the coffee region, having the valley of Cordova for its centre, for the reason that it is the locality at present of the greatest production in the republic, and is most accessible to the American market. But there are several other localities in the country where the cultivation is receiving considerable attention, and is assuming some importance in exportation. One of these localities is the district of Soconusco, in the State of Chiapas, immediately upon the bor-

ders of the republic of Guatemala. Hon. Matias Romero owns a plantation in that district, and the recent revival of this industry here is almost entirely due to his encouragement. Several Americans and other foreigners have located there, and are engaged in planting, and quite a number of the resident proprietors have embarked extensively in this cultivation. Among the special advantages presented in this district, is the cheapness of the land and labor. Public or government lands, which are subject to entry by foreigners, can be taken at from $20 to $25 per caballeria, (a Spanish measure of about 105 acres.) Private lands have been sold at from $50 to $100 per caballeria; but native land-owners here, as elsewhere in Mexico, have very little disposition to part with their estates. Continued success in coffee-culture and a growing demand will largely increase the price. Wages are reported at 25 cents per hand a day; but, of course, this very low price could not be continued with a greatly increased demand for labor. The chief impediment to the development of this industry in Soconusco is the fact that this district is a disputed territory, claimed by both Mexico and Guatemala, and until this vexed question is settled the tenure and protection of property will remain insecure.

The valley of Uruapan, in the State of Michoacan, has great celebrity for its fertility, and for the superior quality of the coffee grown there. But the most noted region, especially for the excellence of its coffee, is the State of Colima, on the Pacific coast; its product being so highly esteemed that it commands a fabulous price in the city of Mexico and more distant places in the republic. The planting of coffee began in Colima in 1858, to a very limited extent, with plants obtained from Costa Rica. The article produced was found so superior to any other grown in the country, sample lots sent to private parties in Europe being pronounced equal to Mocha, that in 1873 quite an impetus was given to the cultivation, and since that year over one million plants have been set out, which are now beginning to bear; and the planting continues to increase, coffee promising to become the principal article of export and a fertile source of wealth to the State. The demand for all thus far produced is so great that it commands in large lots 27 cents per pound at the plantation, mainly for consumption in the interior, a small portion only being shipped to Germany, by

resident German merchants, on private orders. The American consul at the city of Colima places the cost of land suitable for coffee-plantations, including water for irrigation, at from $15 to $30 per acre, depending on location and climate. He states that a plantation containing 100,000 plants four years old (when the first crop is realized) costs from $10,000 to $14,000; the proceeds the first year being about 50,000 pounds, and from the fifth year onward 100,000 pounds or upward; and he estimates the average net yearly gain at $20,000.

Colima and some other States have passed quite liberal laws for the encouragement of coffee-cultivation, offering liberal premiums for the largest crop produced, and exempting coffee-lands from all taxes.

With peace in the country and protection assured, this industry would offer great attractions for foreign immigration and capital. And for the Mexican farmer and land-owner there is no more certain or profitable enterprise in which they can engage. To the common people, the poor, the Indian race, it presents the most desirable source of industry. It can be planted in small lots, garden plots or patches. It requires no costly machinery, like sugar, to prepare it for market. Women and children can attend to the greater part of the work. It is always reliable and commands a ready sale, for cash, at good prices. It will be a happy augury for the country to see the lower and laboring classes more generally engaged in its production, as it will give them a permanent property-interest for peace and against revolutions, and will be for them and the country a most fertile source of wealth.

Mexico for three centuries past has been famous for its great production and exportation of silver. But in coffee alone it possesses a far greater source of wealth and prosperity. Its natural capacity for its production is at least equal to that of Brazil, yet the value of the coffee annually exported from Brazil is more than three times as great as that of the silver and gold product of Mexico.

There are on exhibition, several samples of Mexican coffee. The principal varieties are two; the "caracolillo" of round grain and that of flat grain.

The exhibitors of coffee are the following:

Exhibitor.	*Address.*	*Place of Production.*
Cuastecomatan Co.....	Colima City.....	Cuatescomatan (Colima).
Cirilo Mingo.....	Cordoba.....	Cordoba (Vera Cruz)*
Gral. Escobado.....	San Luis Potosi.....	Uruapan (Michoacan).
Santiago Villa.....	Cordoba.....	Cordoba (Vera Cruz).

*M. Echeverria, Commissioner in New York City.

VANILLA.

Our specimens of vanilla beans come from Papantla, State of Vera Cruz, and their vitality has attracted the public attention. We give the name and address of the exhibitors:

Exhibitors.	*Address.*
J. Bernardino Silvera..... ..	Papantla (Vera Cruz) Comn. in N. Y., Diegner, 11 S. Wm. St.
J. L. Silvera.....	" (V. C.) Comn. N.Y. Hergues&Co.
Matias Collado.....	" " Comn. in Phila. American Agency,in N.Y.,Hergues & Co.
Agapito Fontecilla.....	" " Comn. in N.Y.,Thebud Bros.

The value of the exportation of vanilla in 1873 was $473,038.

Class 638.—COCHINEAL.

The special kind of plants (cactus) where the *cochinilla* lives, constitute one of the characteristic features of the vegetation in Mexico. This is the reason why the dyeing substance to which this note refers, has been considered as a privilege, granted by nature to that country. This gift is specially enjoyed by some districts like Autlan, which on account of its abundant crops of (cochineal insect) has been called. *Autlan-de-la-Grana.* The Mexican exhibition includes specimens of cochineal from the State of Oaxaca and of carmine prepared from that material. Cochineal is sold at an average price of 32 cents a pound.

ANIMAL AND VEGETABLE PRODUCTS.

Class 652. The Mexican exhibition includes several kinds of raw and tanned hides. This article is generally exported in the former shape.

The value of the exportation in 1873 was $1,546,869.

FLOUR.

What we have said in regard to Mexican wheats must be repeated in regard to flours. This manufactured product has not an adequate representation in the Mexican department. Although the country-people do not consume much wheat-bread in Mexico, the one manufactured in the cities is generally of the best quality to be found in foreign capitals. The Mexican consumers are rather particular in regard to this article, so that flour manufacturers are obliged to supply the market with the best kind of products. Some idea of them may be obtained from the samples exhibited in the Mexican section. The flours from Mexico are destined to a great exportation, which at present has scarcely begun.

STARCH.

Starch is extracted from wheat, corn, and other feculent grains grown in Mexico. As a study of the industrial applications of some indigenous or other plants cultivated in the country, the Society of Natural History exhibits samples of starch extracted from the fruits of the following plants: *Jatropha edulis, Erbum lens, Cicer vulgaris, Vicia fabœ, Zea maiz, Phasseolus vulgaris, Solanum tuberosum, Pisum sativum, and Butala edulis.*

Mr. Alfonso Herrera, Prof. of Pharmacy, sent the products of the indigenous plant called "Chayote" (Sechium edule), which gives a starch as pure as the ARROW-ROOT. The Chayote is a climbing plant of the Cucurbitaceæ family, which yields excellent fruit, besides the heavy tubercular roots, which contain a large quantity of starch. The fruit is green, large and covered with thorns. According to Prof. Herrera, the roots Chayote have the following composition:

Water	71.00
Starch	20.00
Resinous matter, soluble in water	0.20
Sugar	0.32
Vegetable albumina	0.43
Cellulose	5.60
Extractive matter, tartrate of potash, chloride of sodium, sulphate of lime and silica	2.25
Loss	0.20
	100.00

The Chayote tubercles, as seen by this analysis, constitute one of the so called *complete* nourishments, since they contain the principles necessary to life.

The Chayote fruits germinate on the free air; they are afterwards sowed in a sandy ground, and the plant grows luxuriantly in the first year, yielding abundant fruit. On the second year it produces tubercles, which can be taken off without killing the plant. This operation is repeated for six or eight years. A plant of Chayote may, according to favorable circumstances, produce annually from 80 to 100 fruits and quite a number of tubercles. The culture of Chayote is extremely easy, without being exposed to those maladies of which the white potatoes and other tubercular roots suffer. The ancient Aztecs cultivated largely this vegetable, and called it "Chayotli," which means "squash covered with thorns."

SUGAR, SYRUPS, Etc.

Class 659. The principal specimens of sugar exhibited in the Mexican department belong to three classes—exportation sugar, refined, and sugar purified with clay.

This product will play a prominent roll in the future exportations from Mexico. The sugar-cane culture is carried on there under extremely favorable circumstances. The lands suitable for its growth are immense, since they comprehend a wide belt along the coasts and several valleys in the highlands situated at a short distance from large centres of population. Such is the case with the valley of Cuernavaca, near Mexico, and the valley of Izucar, near Puebla. The sugar industry is very far advanced, not only in regard to the culture of the plant, but also to the machinery used for the elaboration. In the two above-mentioned sections the same process and instruments used in the *ingenios* of Cuba have been generalized. Some of the haciendas produce even 1,412,200 lbs. of molasses yearly and 2,675,000 lbs. of sugar. The greater part of the production is consumed in the country, and not till this last year has any sugar been exported abroad. We print below the names and addresses of those who have exhibited Mexican sugar at Philadelphia:

EXHIBITORS.	ADDRESS.	PLACE OF MANUFACTURE.
Barron & Co., ...	Tepic (Jalisco),	Tepic.
Garcia Ycazbalceta, . .	City of Mexico, . .	Santa Clara.
Goribar Faustino, . . .	" . .	State of Morelos
Tenango Hacienda, . .	Tenango (Morelos),	"
Oacalco Hacienda, . .	Oacalco (Morelos),	"
Atlihuayana Hacienda, .	" "	"
Yucatan State Government,	Merida (Yucatan),	State of Yucatan.
Puebla State Government,	Puebla City, . .	State of Puebla.

Class 660. *Wines, Alcohol, Etc.*

The State of Coahuila sent to the exhibition some grape wines prepared by Mr. Remijio Rojo. The vine culture and the wine industry, although developed in a short scale, have been very successful, especially in the Northern sections of Mexico. In many of the mountains of the Sierra Madre, these vines grow abundantly and show what degree of prosperity this branch of industry can reach when the producer shall find the way to the foreign markets.

The Mexican section exhibits likewise some cordials, alcohols, and other fermented drinks. Mr. Simon Baeza sent some samples of the former class prepared by himself, with the extract of coffee, orange, rose, vanilla, and other aromatic and medicinal substances.

The alcohols on exhibition are of two kinds: some extracted from the sap of various species of the MAGUEY plant and others from the sugar cane.

Mr. Fernando Campos exhibits several bottles of Tequila liquor, an alcohol manufactured in the town which bears that name, in the State of Jalisco. This liquor is highly esteemed in the country, and even in several parts of the United States. It is extracted from a species of the agave, peculiar to the State of Jalisco. The process of preparation consists in roasting the agaves, after having bereaved them of the leaves, and in their subsequent fermentation.

By similar means alcohols are prepared in several parts of Mexico, and take the names of the place where they are produced.

Mr. Vincente Fernandez, Professor of Chemistry in the Guanajuato College, has lately discovered in the liquors extracted from

the agaves, a new alkaloid to which he has given the name of "agavina."

Pulque is also a national liquor which comes from the sap of agave, subject to fermentation. This article has a large market all over the country, and its production and consumption can be compared, relatively, to those of beer in the United States and in some parts of Europe. Pulque is a liquid while alcoholic, a little acid and foamy. Great medicinal and hygienic qualities are attributed to it, but taken in large quantities is rather intoxicating. The material for the preparation of pulque is obtained by making a large hole near the roots of the maguey, after cutting the most central leaves. Sap accumulates there, and is taken under the name of aguamiel (honey-water) to the deposits where the fermentation takes place.

The "aguamiel" was analyzed by the Mexican Chemist, Mr. Leopoldo Rio de la Laza, and he found in it sugar, gum, albumen, water, resinous matter, and several inorganic salts. The proportion of sugar is 10%. The incinerated residue is composed of potash, soda, lime, magnesia, alumina, chlorine and carbonic, phosphoric and silicic acids.

The "aguamiel" undergoes firstly the alcoholic fermentation, and thus the drink properly called "pulque" is formed; the acetic fermentation comes afterwards, and the liquor is discomposed.

Mr. Jose M. Barragan, Professor of Botany, studied the fermentation of the pulque, and discovered that it developes a microscopic body analogous to the cryptococcus found in the ferment of beer.

The description of that microscopic body, according to Prof. Barragan, is the following: "Body of a cellular form, spherical or oval, its greatest diameter is the eight thousandth part of a milimeter. Free cellules sometimes, but more commonly united in two, three, or four in a sinuous line. The body is soft, transparent, and composed of a membrane; the contents and the nucleus are distinctly perceptible only by chemical reactions; they grow by buds and are reproduced probably by seminulæ, which are easily separated from the cellules; they live in the pulque, and contain nitrogenized principles, without any cellulose."

Prof. Barragan classifies that microscopical body as belonging to the cryptococcus genus, but he believes that there exists some difference with regard to the species which lives in beer.

When the Spaniards conquered Mexico, pulque was already in use among the Mexicans, and a legend connected with its discovery was kept in the hieroglyphical inscriptions of the ancient Aztecs.

From the interpretation of these inscriptions it can be deduced that towards the year 990 of the Christian era, the Toltecs were governed by King Tecpancaltzin. Once upon that time a noble man called Papantzin, accompanied by his daughter Xochitl (flower), went before the king and both offered him liquor which Xochitl had discovered in the maguey plant. Some time afterwards the daughter of Papantzin became the wife of the king, and they had a son named Meconetzin, which signifies "son of the metl or maguey." Meconetzin afterwards reigned in the Toltec's empire under the name of "Topiltzin."

TEXTILE SUBSTANCES OF VEGETABLE ORIGIN.

Class 665—.*Cotton.*

Cotton is one of the natural, most successful growths of Mexico. The large plantations in Durango and other states show the development which this kind of culture is apt to acquire. There are in the section samples of cotton from the States of Morelos, Yucatan, Hidalgo, Guadalupe, Campeche, Oaxaca, San Luis Potosi, Coahuila and Michoacan. The most of the Mexican Cotton is consumed in the national market. Nevertheless the exportation began some time ago, and shows a tendency to development.

Henequen.

The State of Yucatan is noted for a species of agave, called Henequen, which abundantly produces very tough fibres. They are white and lustrous, and are undoubtedly the best for cables, ropes, and similar articles. The Henequen has the advantage that it resists the action of dampness longer than the fibres of which the cables of ships are generally made. This peculiarity was observed by the captain of an American ship which made frequent trips to Yucatan, and who had cables made with hemp and other of the most famous fibres; but in every trip he had to put a new cable. The repetition ceased when he began to use cables of Hen-

equen. Samples of this material and of articles manufactured with it can be seen in the Mexican department.

The following remarks on the Henequen industry were published lately in Yucatan:

"During the year from July, 1875, to June, 1876, Yucatan produced 22,000,000 lbs. of Henequen fibres, the larger part of which (or 18,000,000 lbs.) were exported in the shape of raw material to the markets of New York, London, and New Orleans, and the rest was sent manufactured to Cuba and the Mexican ports.

"Taking $1\frac{1}{4}$ lb. of fibre as an average for the yearly production of each Henequen plant, we come to the conclusion that at present there are more than 18,000,000 of plants under cultivation. For this number of plants over 420 scraping-wheels are in operation, moved by 229 steam-engines with a total force of 1,733 horse-power, and 30 wheels moved by animal-power.

"Each scraping-wheel cleans daily, as an average 300 lbs. of fibre; so the 450 wheels in existence do not work at present but 163 days in the year.

"Taking 280 as the number of working days in the year, these 450 wheels could clean 38,000,000 lbs. of fibre, and as every two horse-power can easily move a scraping-wheel, it is obvious that there is already in Yucatan motive force sufficient to work 866 wheels, which, during 280 days a year, would clean 72,000,000 lbs. of fibre.

"To reach this great increase of production, and to take advantage of all the steam power already existent in the State, Yucatan needs to explote 58,000,000 of plants, or about three times the quantity at present under cultivation."

The data published below show that the production of Henequen has been doubled in the course of four years; and the immense plantations made during the last year warrant that this progressive increase will not stop, and that with the only addition of 400 scrapers to the machinery now in use, Yucatan will export 44,000,000 lbs. of fibre in 1880, and 72,000,000 lbs. in 1883.

Comparing the number of plants *under explotation* with those which must be already *under culture* to increase in 1883, the product of fibre to 72,000,000 lbs., and taking into consideration the system generally followed of planting 72 plants in each *mecate* (a

mecate has 576 square *varas, Spanish measure*), we come to the conclusion that there exists 250,000 mecates *under explotation*, and 550,000 *under culture*. These figures may appear exaggerated; but it is enough to go through the vast fields covered with this valuable plant to feel convinced of its correctness.

The capital invested in the henequen industry can be estimated as follows:

250,000 mecates *under explotation* at $5.00, each	$1,250,000
550,000 mecates *under culture* at $3.50,	1,925,000
Machinery,	600,000
Buildings,	458,000
Workmen's wages,	600,000
Lands,	114,000
Cars, live stock, etc.,	200,000
Total,	$5,147,000

The annual expenditure in the culture and explotation at present is as follows:

Cleansing of 800,000 mecates at 12½c.,	$100,000
Explotation of 22,000,000 lbs of fibre, product of 250,000 mecates, at 1¼c. ℔ lb.,	275,000
General expenses,	50,000
Total,	$425,000

This number divided by 22,000,000 lbs., gives 0.0193 per lb. or 48¼c. per *arroba* (an *arroba* corresponds to the English quarter of 25 lbs.)

So if the arroba of henequen was sold at 50c. it would only cover the expenses of culture and explotation; if at 5 reals (62½c.), it would leave an annual profit of 2½ per cent. on the capital invested; if at 6 reals (75c.), it would leave a profit of 7 per cent.; at 8 reals (87½c.), it would leave a profit of 9¼ per cent.; and finally, for the increase of every real (12½c.) on the arroba, there would be an increase of 2¼ per cent. on the profit.

The 800,000 mecates now under culture will give, when in explotation, the following results:

INVESTED CAPITAL.

800,000 mecates at $5, - - - - - -	$4,000,000
Machinery, with the addition of 400 scrapers, -	680 000
Buildings, - - - - - - - -	550,000
Lands, - - - - - - - - -	114,000
Workmen's wages, - - - - - -	800,000
Wagons, live-stock, etc., - - - - -	400,000
Total, - - - - - - - -	$66,544,00

ANNUAL EXPLOTATION EXPENSES.

Cleansing of 800,000 mecates at 12c., - - -	$100,000
Explotation of 72,000,000 lbs. of fibre at 1c., -	720,000
General expenses, - - - - - -	200,000
Total, - - - - - - - -	$1,020,000

This number divided by 72,000,000 lbs. of fibre gives about 0.0142 per lb., or 35½c. the arroba.

Therefore, if the fibre would be sold at 3 reals (37½c.), it would cover all the expenses of culture and explotation; if at 4 reals (50c.), it would leave a profit of 6½ per cent.; if at 5 reals (62½c.), it would leave a profit of 12 per cent.; if at 6 reals (75c.), the profit would be 17½ per cent.; if at 7 reals (87½c.), 23 per cent.; if at 8 reals ($1), 28½ per cent.; and finally, for the increase of each real (12½c.) in the price of the arroba (25 lbs.), there would be an increase of 5½ per cent. in the profit.

This is the *present* and the not far *future* of the henequen industry in Yucatan. Its prosperity depends, as that of all other industries, upon making the production as large and cheap as possible, so as to enable the producers to maintain the competition with their rivals. The farmers of Yucatan must be under no uneasiness that their fibre may be overlooked in the market on account of its abundance. On the contrary, this would be one of its most esteemed qualities, since the great markets in the world open their doors only to those who invade them in colossal proportions; and it is enough to read the foreign mercantile reviews to see that, with the exception of the New York market, where henequen has already

been introduced, the Yucatacan fibre has yet to conquer its deserved place at the side of the textile products of other countries.

Fibres of the common Mexican agave are also seen in our section, together with the varied manufactured products of that precious plant. There are some very fine woven goods made with the said material, and white and shining ropes which look as if they were made of silk. Much attention has been paid to the paper made with the maguey fibre. The fabrication of this article is a new industry, destined to a great development, owing to the quality of the product and to the cheapness of the material. This is extremely abundant, not only in Yucatan, but in the Valley of Mexico, where the plantations of maguey are very extensive. The larger introduction of scraping-machines to extract the fibre from the maguey leaves would undoubtedly be productive of great prosperity, since the paper-mills would be multiplied and the exportation of that article increased. In the Valley of Mexico and other localities the leaves of maguey are more than 9 feet long.

Besides the many useful products already mentioned, the maguey gives gum, sugar, honey, etc.

Some curious fibres, known under the name of *pitu*, were sent from the State of Oaxaca. They are probably the product of a Bromilaceæ plant. The fibres are extraordinarily fine and from 6 to 8 feet long. For the fineness and toughness of that textile it is more commonly used in belt-making works.

The Society of Natural History exhibits some fibres from the malvaceæ plants. The species of this family are very common in Mexico, and produce very tough, soft, and lustrous filaments resembling silk. This is the case especially with the species of the SIDA genus, which is known under the vulgar names of HUINARI and POPOTALATUA. The SIDA ROMBOIDEA develops itself largely in the Valley of Mexico in Michoacan, Morelos, and other States. A company has been organized for the explotation of malvaceæ textiles. Messrs. Pablo M. Rivera and Francisco Vera, engineer, can give information on the subject. Both of them reside in the City of Mexico.

PRESERVED PLANTS.

Class 709. The Society of Natural History exhibits specimens of the "linquen tintoreum," a coloring plant which grows in Lower California. The "linquen" at present is an important commercial article. It is generally called Orchilla, its botanical name being Rocella Fucciformis, a variety of the Acarius Linearis. This plant was mentioned when speaking of the dyeing substances of vegetable origin; but it must be cited under this class, which embraces all the dissected plants.

A commission of the Society of Natural History made a very cautious study of this plant, in order to seek the means of obtaining the largest quantity of coloring matter at the least expense. The conclusions arrived at by this commission are as follows: That the Mexican Orchilla contained two coloring matters already formed, and a third (the red one) which was developed by the reactions; that to separate them it is necessary to treat the "liquen" with hot water, which takes away the green substance and with the alkalies to obtain the red matter. Those substances once separated from the "liquen," the residue is treated with alcohol in order to obtain in solution the yellow principle; that it was not necessary too minutely to divide the "liquen" in order to treat it with the alkalies, because the further it was divided the products would be less pure; that the alkaline carbonates, especially that of soda, were preferable as reactives to extract larger quantities of the coloring principle of the plant.

INDIGENOUS PLANTS OF THE VALLEY OF MEXICO.

Perhaps it would be not out of place to give here, a list of the families and species of the indigenous plants growing mainly in the Valley of Mexico, a collection of which contained in six large volumes, has been sent to the exhibition by the National Preparatory School. Out of these volumes, five contain two hundred and seventy-four plants, from the valley, which were classified by Messrs. Jose Barragan, Alfonso Herrera, y Francisco Corderoy Hoyos; the other volume has seventy different ferns, the largest number of which belong to the western regions of the Republic. They were collected and classified by Mr. Schaffner. Each of the first mentioned plants, in these herbaria, are accompanied

by a brief explanatory notice, stating both its common and scientific synonymy, its period of floration and its uses, and have been classified according to the system of Endlicher, as follows:

Families.	*Species.*	*Families.*	*Species*
Marcanciaceæ	1	Convolvulaceæ	4
Ferns	7	Polemoniaceæ	3
Polypodiaceæ	19	Solanaceæ	12
Salviniaceæ	1	Utriculariæ	1
Licopodiaceæ	7	Escrofulariaceæ	6
Gramineæ	32	Primulaceæ	1
Cyperaceæ	8	Ericaceæ	1
Eriocaulonaceæ	1	Umbelliferæ	3
Comelinaceæ	6	Crasulaceæ	2
Alismaceæ	1	Ranunculaceæ	2
Juncaceæ	3	Papaveraceæ	3
Pontederaceæ	1	Cruciferæ	5
Libiaceæ	1	Risidaceæ	1
Bromeliaceæ	1	Loaseæ	1
Orchidaceæ	1	Cucurbitaceæ	1
Cupresineæ	3	Bignoniaceæ	1
Abietineæ	1	Portulacacæ	1
Piperaceæ	1	Cariofileæ	3
Urlicaceæ	2	Malvaceæ	7
Amarantaceæ	4	Esterculiaceæ	1
Toligonaceæ	2	Acerinæ	1
Quenopodiaceæ	3	Ramnæ	1
Nictagineæ	3	Euforbiaceæ	2
Plantaginacæ	1	Anacardiaceæ	2
Compositæ	50	Geraniaceæ	3
Sobiliaceæ	2	Oxalideæ	1
Rubiaceæ	5	Eusteraceæ	6
Asclepiadaceæ	5	Litrarieæ	3
Labiatæ	4	Mirtaceæ	1
Verbenaceæ	2	Rosaceæ	2
Asperifoliæ	1	Leguminosæ	1

Nobody acquainted with the present state of Mexico, could deny that her agriculture has found a way to a solid and progressive development. It could not be otherwise, since that country affords

the most favorable conditions for nearly every kind of culture, and even some facilities, which are the result of social economy, and have been lately created by the common efforts of the Government and the productive classes. Prominent among those facilities is the system of cheap transportation warranted by the tariffs of the *Mexican railroad*, the rates of which were reduced three years ago, as a stimulus to the progressive movement of the agricultural products towards the foreign markets. Capital and population are the greatest needs of the agriculture in Mexico. Those two elements would bring with them, the introduction in a large scale, of the money and labor-saving processes enabling thus, the agriculturists, much benefited already by the natural advantages, and the cheap wages, for a successful competition in the markets of other nations.

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